University of Alberta

North American Cattle Frontiers and the Capitalist World-economy

by

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PREFACE

This project has its roots in two interests. First it is motivated by a concern for the environment. Not for sentimental reasons, but because there is an abundance of scientific evidence strongly forewarning us that the planet's ecosystems are being pushed beyond their capacity to self-regulate and replenish themselves. These environmental issues are made more complex because they have their genesis in humanity's deep-seated social problems rising from conflicts around gender, race, ethnicity, culture, and the economy. Hierarchical institutions that are organised to dominate and exploit people are the same structures that dominate and exploit nature, making the source of ecological crises at once institutional, ideological, cultural and social. Presently, these aspects of human activity are dominated by capitalist ideology and practices that utilize a variety of strategies to manipulate the social and cultural lives of people. The capitalist's aim is to continually commodify the consumptive needs of people by working toward a system of beef production that exploits some people and nature to the degree that their circumstances contradict the collective and universally professed values of Western society of mutual respect, ethical treatment, and cooperation. The resolution of any environmental crisis comes when we recognize the social causes that persuade us to ignore the limits of nature.

The second is my interest in world-system analyses as useful tool for studying social-historical transformation. World-systems analysis is an approach to historical sociology that analyses the sources and mechanisms of social change over long periods of time. In this study the focus will be on the sources of social change in relation to a capitalist mode of accumulation. To that end, the beef industry exemplifies a nexus between social, economic, institutional, and ideological aspects of the social life and reveals the difficulties societies have in changing their patterns of eco-social interaction when ecological degradation is evident. The consumption of beef in America represents more than a food source. It is a culturally specific non-indigenous food source that has had enormous impact on the local and regional ecosystems of Europe and North America.

I do not advocate a vegetarian diet. Meat is an important component of a healthy diet. I chose beef because it is relevant and demonstrates the need for serious changes in how we organize our relationships to nature. It is my sense that the goal of eco-social sustainability will require more than a desire for change; it will require people to change not only their habits, as they come to realize that something as fundamental as eating has social and ecological consequences. It is at its core a relationship reflecting how we as a society interact with the land, but also I think it reveals how we will cope with the deepening of negative environmental consequences of cattle production. I think North Americans should not be surprised by the revelation that there are deep connections between the archetypal North American diet of a burger and fries, capitalist accumulation, and the exhaustion of the world's ecosystems. I contend, therefore, that the seriousness with which Americans and Canadians treat the eco-social issues surrounding beef will say something about the seriousness North Americans will bring to bear on environmental issues directly affecting them in general.

I would like to take this opportunity to thank a number of people who have inspired and influenced this work. First to Professor Satoshi Ikeda goes my most sincere thank you. Without his encouragement and guidance this project would not have taken shape, or even been possible. To Professor Gordon Laxer my many thanks for his very insightful and useful comments. Gordon took on the unenviable task of challenging my account of social change, which I hope have led to better explanations and clarity on my part. I am grateful for his input. I would like to thank Professor Suasanne Soederberg of the Political Science Department for stepping into the breech and agreeing to sit on my defence committee on such short notice. Her comments are appreciated and helped to shape the final document. I wish her well in her new appointment at Queens University in Ontario. Special thanks must also go to Professor Mike Gismondi. Unfortunately, for administrative reasons, he was not permitted to sit on my defence committee; however, he continued to offer his council and editorial expertise. I am very indebted to his efforts. Of course the responsibility for interpreting and incorporating their insights and suggestions are my own and any mistakes that follow from those efforts are entirely mine. Finally, I look forward to a continuing opportunity to learn from their expertise as I progress through my academic career.

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INTRODUCTION

> All production is appropriation of nature on the part of an individual within and through a specific form of society.
>
> Karl Marx (qtd. in Tucker 1978: 226)

Access to affordable beef in North America has come at a social, economic, and environmental cost. While we would not expect there to be no impact, current practices involving cattle and factory farming operations of multinational, horizontally and vertically integrated corporations, though legitimately working within the structured processes of a capitalist world-economy, are having disturbing consequences on human health, the environment, and the animals themselves. The North American[1] beef industry is using industrialised agricultural practices that are unsustainable and inhumane. The point of this inquiry is to examine how the social historical circumstances surrounding beef production since the sixteenth century are connected to present-day practices and to see whether that history is indicative of how the industry will deal with future crises.

Many North Americans continue to believe that each individual consumer has the right to demand beef at nearly every meal without ever counting the environmental or social costs or considering the ethical treatment of another sentient species. One reason for this situation is that consumers are disconnected from their food sources by a series of commercial practices that favour business interests at the expense of ecological harmony and human communities. As a result, consumers are generally unaware of the processes involved between raising cattle and eating beef. The subsequent ecological degradation is even less apparent; yet industrialized agriculture—the 'factory farm'—has been implicated worldwide in deforestation, air and water pollution, soil erosion, desertification, and the loss of biodiversity and habitat. Beef production in its industrialized form uses more environmental inputs and causes more waste and pollution than at any time in history. In North America it now takes approximately 8 kilograms of grain to produce 1 kilogram of beef. It results in the loss of 16 kilograms of topsoil for every kilogram produced (Rifkin 1992: 160, 203). Furthermore, cattle produce about 20 to 25 kilograms of manure every day (MacLachlan 2001: 80). When this waste is produced and mismanaged in the confined spaces of a commercial feedlot it becomes a major source of water and soil pollution. In addition, industrialised production practices are highly mechanized using 9 litres of gasoline and 200 kilograms of oil for every kilogram of beef produced (a 1990 figure). Averaged across the American population the agricultural industry also uses an estimated 28 kilograms of fertiliser per person, most of which go to producing feed for cattle (Clark 2000: 228, 240). Today fully 70 percent of American grain production goes to feed livestock (Badgley 2000: 206; Rifkin, 1992: 59), as do 70 percent of all the antibiotics used in North America (Salvi 2004). The waste, pollution, overuse of resources, and health risks associated with industrialised beef production are not paid for by the corporate interests that benefit from these practices or reflected in the relatively low prices consumers pay for beef. Rather, these costs to society and the environment become *externalised* from economic activity and are transferred onto local communities or onto society as a whole.

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[1] Throughout this paper the term North America refers to the United States and to Western Canada, particularly the so called Palliser Triangle—the northern tip of the Great Plains—where similar cross-border production practices are used and the same historical processes apply. At no time will I use North America to include references to central or eastern Canadian cattle-raising practices or production unless specifically stated; although North American statistics and the associated environmental impacts will refer to North America in its entirety. The reason for this usage is that the opening of western cattle-raising practices in Western Canada is entirely an extension of the opening of the West in the United States and was a part of that process. Cattle-raising in Eastern Canada was quite isolated and lagged behind the developments of cattle-raising in the rest of North and Central America, and served mainly local markets and British interests. Ontario and Quebec cattle-raisers up until the nineteenth century were "unable or unwilling" to compete with their American counterparts; therefore, Canadian markets remained small and underdeveloped. The Eastern Canadian cattle economy was often the target of overproduced American beef. This resulted in the delayed development of the livestock industry in Eastern Canada (McCallum 1980: 40-1). Canada's beef industry differs somewhat in how it is regulated, especially in the twentieth century, but this had little impact on the historical spread and capitalist production of cattle across North America or on how cattle effected the environment. Canada, as will be discussed briefly in the final chapter, has for the most part been a follower and imitator of American practices and expansion. Therefore, the spread and production of cattle for markets in the United States and the subsequent transformation of the continent is a North American event.

The difficulty of *internalising* these costs in a capitalist economic model is being debated under the general rubric of 'sustainable development.' John Bellamy Foster in *Ecology against Capitalism* argues that one of the barriers to internalising costs is that capitalism fails to see itself as a subsystem within a much larger planetary system (2002: 36).[2] Quite the opposite, capitalism meets its profitability goals by subordinating the environment and not paying the true costs of producing commodities. That omission is at the heart of the contention that there is a contradiction between nature and capitalist accumulation achieved through industrialised agribusiness.

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[2] Arguments to internalise costs are problematic because they imply some version of the 'sustainability hypothesis,' which assumes that the biosphere can be reduced to some form of "natural capital" (Foster 2002:37). This debate, however, is not the focus of my argument. The point here is to direct the readers attention to the contradiction between nature and capitalist production.

This study explores the linkage between the environment and political economy. Sociologist Peter Grimes argues that they are *causally* linked and that if we analyze the role of each we can understand the causes of ecological degradation and make changes (1999: 14). Conceptually, he treats capitalism and nature as opposing, objectified entities that act upon one another. In contrast, I would argue that the relationship between the political economy and nature is an internally related set of processes. Our experiences of nature are historically produced forms mediated through human labour, which in turn determines the historical form of nature. That is, nature is not treated as a given, but as socially constructed through historical patterns of behaviour. In such a case, nature is not understood by using common terms of reference as leaning toward either realism on the one hand or constructivism on the other. This is a false dichotomy rooted in a logical positivistic frame of reference that generates yet another unwarranted dualism that can neither be properly assessed nor verified through the limits of human experience. A better alternative is to focus on the historical and reject positivism's epistemological foundationalism that entails reducing the world to either ideographic or nomothetic explanations (Wallerstein 2000; 2001). That does not mean that positivistic quantitative methods of measuring cannot be operationalised within a comparative historical approach to social history (Skocpol 1984; Somers 1996). We do not need a known verifiable ideal state of nature to comprehend whether a landscape is being overstocked or overgrazed. Instead, the state of nature can be assessed by comparing the historical patterns that emerge due to those pressures.

From the perspective of this world-systems researcher the way to avoid the dualistic problems inherent in positivism is to historicize them. It is an approach that is part of the 'historic turn' in the social sciences that has emerged in the post WWII era (Smith 1991). By historicising theoretical approaches the rug is pulled-out from epistemological foundationalism allowing for a type of pragmatic methodology[3] unhindered by having to provide answers for the problem associated with dualist typologies. In my view, human knowledge is mediated through socio-historically constructed perceptions experienced by individuals. Human activity is the source of knowledge. Marx called this activity labour, which he defined as a "condition of human existence that is independent of all forms of society, a perpetual necessity of nature in order to mediate the material exchange between man and nature, in other words human life" (Marx qtd. in Habermas 1972: 27). Nature can no more be separated out from human activity anymore than an individual can be separated from his or her social context. Marx understood this when he wrote in the *Economic and Philosophic Manuscripts of 1844* that "Neither nature objectively nor nature subjectively is directly given in a form adequate to the human being" (Marx qtd. in Tucker 1978: 116). Subsequently, nature is known to humankind through the history of human praxis. Marx continues,

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[3] Raymond Morrow in his book *Critical Theory and Methodology* (1994) argues that critical theorists must reject epistemological foundationalism because of its positivism. To overcome this problem. Morrow suggests a pragmatic methodology that allows the social scientist to investigate the world without having to make normative claims about the certainty of knowledge. Similarly, Hopkins and Wallerstein reject positivistic epistemology because

> Labour is, in the first place, a process in which both man and Nature participate, and in which man of his own accord starts, regulates, and controls the material re-actions between himself and Nature. He opposes himself to Nature as one of her own forces, setting in motion arms and legs, head and hands, the natural forces of his body, in order to appropriate Nature's productions in a form adapted to his own wants. By thus acting on the external world and changing it, he at the same time changes his own nature (Marx qtd. in Tucker 1978: 344) (*emphasis added*).

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it results in idiographic and/or nomothetic claims that cannot be verified. In their view the best way to overcome positivism is to historicize social analysis in the view that since the past and the present are rationally connected—the present can be socially analyzed in relation to changes through time (Wallerstein 2001). The goal is to navigate a 'middle way' between the idiographic and nomothetic by recognizing that all social explanations are constrained by what is historically and systemically prior to it. This synthesis restricts social explanations to studying the "general laws of particular systems and the particular sequences through which these systems have gone" (2000: 136). This has not been the case with the West's Enlightenment project. It assumes that social explanations originating in one historic system can be applied universally across time and space, or that the history of human beings is incrementally and progressively marching toward better and better days. World-systems analysis rejects outright the concepts of universalism and historical progress (Hopkins and Wallerstein 1982: 42). In the end, historician Terry McDonald writes that by turning toward history the social sciences may find some "respite" from these endless debates about dualism (McDonald 1996). Therefore, I will attempt to write a descriptive historical narrative with the goal of examining some of the trends that have resulted in social change, as well as testing if the mechanisms for social change suggested by other world-systems researchers can be established by analysing the history of cattle-raising in relation to the capitalist world-economy.

At present, the relationship between nature and society is mediated through the ideology and practices of capitalism, which generally refer to a set of strategies that are employed to dominate and exploit social relations for the sake of wealth accumulation by maximizing profits, including those social relations between labour and nature. It is a set of relations according to sociologist Sing Chew governed primarily by economic interests (Chew 2002: 218). As a result, "nature" is continually subject to the processes of commodification (Foster 2002: 30ff.). The success of which depends upon the legitimating powers of social institutions, especially governments that codify a legal framework conducive to capitalist's interests. There is a 'logic' to capitalism that structures and infuses social relations around capitalist interests and practices (Amin 1997: ch. 1) that I will refer to using sociologist Christopher Chase-Dunn and Thomas Hall's notion of *capitalist mode of accumulation*. This refers to any world-system[4] mediated by socialized and institutionalized processes that prioritize "price-setting markets" (1997: 42).[5] Other times I use capitalist economic relationships as its conceptual equivalent. These are not a set of social relations specific to a mode of production in the Marxist sense, but the notion that the logic of capitalist accumulation dominates the ideas and practices of individuals and institutions throughout the beef industry within the capitalist world-economy. Capitalism is not just an economic model, it is also infused with a set of normative beliefs, values, and judgements that help to reproduce capitalism within a world-system.

Subsequently, it becomes interesting to ask about the possibility of ecological sustainability within a capitalist world-economy. At issue, is not a technical debate about the value of particular farming methods for attaining sustainable production, rather to see whether the emergence of proposed solutions, like biotechnology, emerge because they are the best solutions to the problem of unsustainable beef production or because these types of solutions conform to the ideology of profitability by increasing productivity, which entails lowering production costs and increasing efficiency.

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[4] Wallerstein defines a world-system as a social system "that has boundaries, structures, member groups, rules of legitimization, and coherence. Its life is made up of the conflicting forces that hold it together by tension, and tear it apart as each group seeks eternally to remould it to its advantage. It has the characteristics of an organism, in that it has a life span over which its characteristics change in some respects and remain stable in others. One can define its structures as being at different times strong or weak in terms of the internal logic of its functioning" (1974: 347).

[5] The authors define a mode of accumulation as "*the deep structural logic of production, distribution, exchange, and accumulation*," [sic] and think it is preferable to a Marxian notion of a mode of production because it broadens the role of capitalism beyond the focus on production (1997: 29ff.).

I am not just attempting to give an historical account of the beef industry in North America. It is intended to be a sustained, historically specific, sociologically driven account focused on the relationship(s) between the introduction and spread of cattle across Central and North America, the development of cattle-raising and processing practices as they relate to social, political and economic interests, the transformation and degradation of the environment, and the influence of a capitalist mode of accumulation on cattle-raising and processing practices. This is a discussion not found in the existing literature. Changes in cattle-raising and processing practices over the last five centuries affirm that social transformation has had its roots in the imperative to accumulate wealth by maximizing profit. And that, I believe is the main contribution of my analysis: it reveals how the social historical circumstances surrounding cattle distribution and production continue to be conditioned by a set of exploitative strategies deployed by capitalists that intentionally or otherwise further deepen the contradiction between humanity and nature, but more specifically the interaction between cattle production and land use.

Methodology

Historical Sociology

Historical Sociology presumes Marx's most famous proposition that "Men make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly found, given and transmitted from the past" (Marx qtd. in Tucker 1978: 595). This idea is at its heart a relational historical materialist approach, which emphasises the reproduction of life. In other words, for Marx there is a relation between past and present created by humans through social and historical practices. In this quote, circumstances are not necessarily reduced to social relations of production, but also include cultural forms, signifying practices, political productions, and ideological relations.

The famous French historian Fernand Braudel accepts the premise specified in this quote, but is critical of Marx's analytical approach. According to Braudel, Marx correctly identifies the importance of grasping the historical context for analysing social change, but fails to explain the historical processes that transform social life. Braudel argues in *On History* that Marx's social historical analysis depends too much on the "microtime" of events instead analysing the 'mass of history' that operates beyond the control of individual actions (1980: 39). This view of historical sociology is what distinguishes world-systems analysis from Marx, establishing for itself a useful perspective for analysing world-historical transformation while still remaining connected to the historical foundations of sociology.

Braudel sought to analyze the deeper collective structures of social life. He thought the best way to understand the conditions for social change was to transcend the events of history—*l'histoire événementielle*[6]—and examine that "unconscious" realm (of social structures) beyond the consciousnesses of individuals (1980: 67). It is that same 'unconscious history' that underwrites Terence K. Hopkins and Immanuel Wallerstein's world-systems approach to historical sociology. They describe all structures as historical processes that must be understood through their historical "origins and contexts," while also recognizing that the "form and substance" of these historical structures are continuously evolving and changing. Second, no sequence of events is structureless. All events occur within the structures established by previous historical processes and are subject to their constraints (Wallerstein 1978). Accordingly, there are no permanent or fixed structures in any world-system (1996: 17). Rather, history is a dynamic and directional process whose analysis requires the social scientist to allow, as Braudel did, the "[p]ast and present [to] illuminate each other reciprocally" (1980: 37). As such, the useful study of history examines the long-term trends of the collective life. It studies economies, institutions, and other social structures to understand the social forces that impact societies (1980: 11). Together Braudel, Hopkins and Wallerstein offer an historical sociological method that tends to prioritize structural explanations of social change, and understand all social actions and explanations as also situated among those processes of history.

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[6] Braudel defines an event as a short time span—"a matter of moment" whose "delusive smoke fills the minds of its contemporaries, but it does not last, and its flame can scarcely ever by discerned" (1980: 27). It is a time span characterized by the events of individual daily lives. Conscious history does not discern the structured processes that carry history along (1980: 39). Elsewhere he writes that the history of events is but "a surface disturbance, the waves stirred up by the powerful movement of tides. A history of short, sharp, nervous vibrations" (1980: 3). Agency is not denied, rather he thought the story of social change was best told with reference to the processes of history over the *longue durée*. It was through this lens that the social sciences must

Historical sociology from the perspective of world-systems analysis is a methodological approach, not a theoretical approach. On this Wallerstein was emphatic: "World-systems analysis is not a theory about the social world, or about part of it. It is a protest against the ways in which social scientific inquiry was structured for all of us at its inception in the middle of the nineteenth century" (2000: 129) precisely because theories that develop categorical frameworks must also depend upon the contingencies of historical circumstances to formulate those ideas. This was an important shift in analytical perspective later adopted by world-systems analysis. Thomas Kuhn in *The Structure of Scientific Revolutions* (1962) undermined epistemological foundationalism by observing that once a scientific theory no longer explains the data there is a paradigm shift. The point was not to discredit the usefulness or the need for theory as a way of managing empirical and historical information but to show that even scientific knowledge has a history that it is not fixed or value-neutral. By extension there can be no received 'truth' about social life since truth too has a history (Wallerstein 1996). It was Kuhn's work that has resulted in historic turn in the social sciences because it avoids the epistemological problems inherited from the past between idiographic and nomothetic explanations (McDonald 1996; Somers 1996). As a consequence, universalism and developmentalism (the notion history progresses through a series of stages and those different societies generally develop independently along similar trajectories) are rejected as useful social explanations (Hopkins and Wallerstein 1982: 42). At best, therefore, social historical analysis can only generalize about the mechanisms for social change.

In that sense this study is "guided by theoretical concerns," while at the same time aiming to present "an improved theoretical account" (Hall 1989: 6) of change within the beef industry. This clearly places the emphasis of this project on sociology accomplished by fusing the empirical evidence with an historical account (Hopkins 1979: 42). The goal is to then present the historical facts so that the "story" itself becomes the theoretical account of the conditions for social change. The sociologist makes this analysis by

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ultimately analyse the conditions that constrain social change because those living at the time of social change do not usually discern it (1980, 84; 1995:

comparing the connections within and between the local, regional, and global levels of the world system (Hall 1989: ch. 2); in this case, the study of cattle as a world-system within the capitalist world-economy. By applying some existing theories of social change, like John Bellamy Foster's notion of *metabolic rift* (see ch. 2), I will attempt to see whether there is a "fit" between historical circumstances and theory, while recognizing the impossibility of closing the gap between an explanation of the totality of historical processes and the imperfect perspectives of individual investigators standing within those processes. Still, the larger goal of this thesis is to dispel any fixed sense of a traditional or naïve notion that the cattle industry is a 'natural' affair that has little or no environmental impact.

Some preliminary assumptions and conceptual tools

This paper begins with a number of assumptions that will help frame the discussion about the commodification of cattle. First, that there is a capitalist world-economy, which emerged out of the collapse of Europe's feudal system during the 'long' sixteenth century,' generally dated from 1450 to 1640 (Amin 1991; Friedmann 2000; Moore, 2003: 99; Sweezy 1972: 5; Wallerstein 1974: 15, 1979: 53). However, the capitalist world-economy did not suddenly emerge contemporaneously around the world or even within Europe. It was a long, uneven and volatile transition that did not become a global system until "the late nineteenth century" (Wallerstein 2000: 140). Amin, who agrees with the sixteenth century dating, characterizes the emergence of the capitalist world-economy as a process of maturation (Amin 1998: 14). And though Braudel dates the beginning of capitalist-type markets during the twelfth century in some of the Italian city-states, he does agree that it was a process highlighted by a "growth spurt" in Britain in the sixteenth century, especially after 1570 (Braudel 1982: 28-81)[7] based on the ability of "middlemen" to finance long distant trade (1977: 46). Historian William McNeill also notes a significant shift in Europe's fortunes after 1500—the beginning of the 'modern period' (1991: 565; 1996: 224). He ties Europe's emerging political and economic

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21).

[7] Braudel has elsewhere conceded that European markets were relatively synchronous by the fifteenth century because of the presence of integrated trans-national trade (1984: 75).

fortunes to the discovery of the Americas, which acted as a catalyst to quicken the pace of political, economic and social change as they sought to take advantage of the potential for growth (1991: 565-599). It gave life to a newly emerging economic system.

What distinguishes the capitalist world-economy from other historic distributive systems is the priority given to the accumulation of capital. Before the sixteenth century other interests often blocked or subordinated capital formation (Wallerstein 1983: 14; 1992: 571). For Wallerstein, capitalism is a *form* of market trade merged with a 'world-economy,' which is a social system that has a single division of labour comprised of a multiple of polities and cultures. One is not the cause of the other, but stand as the "obverse sides of the same coin" (1979: 6). The capitalist world-economy is a conceptual tool that gives expression to a system of distribution and production that focuses on the accumulation of wealth by maximizing profits. The resulting patterns of trade connecting sites of production and consumption over great distances presented Europe's rich upper classes with unheralded opportunities for financial gain. Patterns of trade began to emerge as these "capitalists," perhaps unwittingly, changed distant market economies by investing in and profiting from the commodification process. Called commodity chains, they refer to "a network of labour and production processes whose end result is a finished commodity" (2000: 223) that once established are continually reorganized and restructured deepening their hold over competing economies. It is commodity chains not political borders that define the boundaries of the capitalist world-economy, the development of which is commensurate with growth of commodity chains (2001: 109). In principle, a capitalist world-economy could consist of just one commodity chain. In actuality, however, a capitalist world-economy is a network of numerous and interrelated commodity chains. Capitalism, then, "was from the beginning an affair of a world-economy and not of nation-states" (1979: 19). That has been the reason for its success as a mode of accumulation; capitalists have the ability to operate trans-nationally, beyond the capacity of any one nation to control it (1974: 349). By 1500 this "one particular world-economy" (2001: 232) was taking-hold in Western Europe, especially led by those "capitalists" and monarchs who stood to profit from the fusion of political power and capitalist practices. Through there efforts a periphery had emerged by 1600 that had not existed in 1450, extending into east-central Europe and the Hispanic Americas (2001: 109).[8]

Second, I assume that the capitalist world-economy is a system of *unequal exchange* where the benefits of trade tend to accumulate in the core at the expense of the periphery. That is, all world-systems are hierarchical in nature, which seek to dominate and exploit the other. It is also a system experiencing increasing polarisation (Gill 1996: 236; Hopkins 1982, 21, 47ff; Roberts and Grimes 1999: 74; Wallerstein 1974: 350). Amin describes it as a system where the bourgeoisie at the centre exploit those in the periphery more "brutally" than those proletariat in the core (1976: 196). The antinomy between capital and labour equally describes the structural inequality throughout the capitalist world-economy (1997: 16). It is a system characterized by the dependency of the periphery on the core in that trading patterns favour the core as more exchange occurs within and between commercially successful centres in the core, while trade in the periphery occurs mainly between themselves and the core (1976: 246-7). Dependency is not based on a lack of capital investment in the periphery, but is paradoxically the result of capitalist development (1996: 60). Capitalists tend only invest in ventures with potentially profitable outcomes, so any surpluses produced in the periphery as a result of that investment accrue back to the capitalists in the core, preventing the periphery from improving its circumstances. This is a structural problem that results in an inherently "unegalitarian" system (Wallerstein 2001: 92) characterized by a multiple of states and political systems organised around a single division of labour between the periphery and the core (1974: 349; 1979: 5).

According to Hopkins, this core/periphery division of labour is a relational concept that attempts to show the direction of capitalist accumulation rather than for establishing categorical distinctions representing nation-states that have the capacity to act upon one another. The equivocation of core/periphery relationship with independent countries whose relations are mediated by trade relationships will result in a description of historical circumstances rather than revealing the conditions for social transformation.

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[8] According to Wallerstein the capitalist world-economy would have included much of Europe and parts of the Americas, but not Russia, the Ottoman Empire, the Indian subcontinent, or West Africa. The latter two would have joined-in next during the second great expansion of the capitalist world-economy from 1750 to 1850 (2001: 250).

Rather, countries belong to a dynamic system of state structures where core/periphery relations predominate. The focus must be on the interdependence of core/periphery relations where the division of labour is used to describe how a world-system, of which the beef industry is a part, are impacted by the 'logic of capitalism,' which generates surpluses by dominating and exploiting the periphery, while accumulating the benefits in the core (Hopkins 1979: 32-3; Hopkins and Wallerstein 1982: 151-2). Clearly, those centres of accumulation are found within the boundaries of political systems dominated by a bourgeois class that have access to power over the production of commodities at the expense of those in the periphery (Wallerstein 1979: 162). This division of labour within the interstate system facilitates core/periphery patterns of accumulation, favouring some countries at the expense of others. States try to manage their position in the interstate system by protecting the rights of capitalists to trade and accumulate wealth. The protection of the profitable segment of "commodity chains" becomes an instrument of power that increases the core state's ability to accumulate wealth within the interstate system (2000: 261). Though it must be said, that it has never been Wallerstein's view that the *only* 'unit of analysis' is the nation-state, rather he argues that capitalists residing in various states use the state apparatuses to protect and legitimate their interests. The stronger the state, the more influence it has within the interstate system (1975: 23; 1979: 18-19).[9] The core/periphery model also applies to local and regional patterns of accumulation within the boundaries of a nation-state, as will become apparent in my analysis of cattle. For these reasons, therefore, I think the boundaries of the core and periphery remain necessarily ambiguous, but not without meaning, depending upon the particular time, place, and social conditions being analysed.

Third, that examining economic histories does not lead to economic determinism and/or reductionism. The economic life is virtually indistinguishable from the social or political life. How this idea is expressed in narrative is much more problematic and difficult to achieve. For instance, Amin contra Wallerstein argues that the structured processes shaping the social, political, ideological, and economic lives of actors can each be viewed as modes of understanding that each have their own 'logic' while simultaneously arguing that it is "impossible" to determine which of these logics will dominate at any particular time or place since each sphere continually competes with the other (Amin 1998: 50-1). Braudel sees these 'logics' as 'set of sets'—"*ensemble des ensemble*." He considered all relations as internally related set of processes that cannot be separated from the totality of social history without losing some connections. It is for convenience we emphasise particular aspects of the social life. Braudel suggests four: economic, social hierarchy, politics, and culture though the role and importance of each vary through time (Braudel 1982: 460). Wallerstein is more specific. He argues that the current capitalist world-economy has particular social features, namely private property, commodification, particularly of land and labour, and the sovereign state (1992: 573ff.); therefore, the focus of social analysis should be on these issues and trends within the capitalist world-economy. In his view the world-systems perspective is quite straightforward:

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[9] A world-system does not tend toward equilibrium, as is the case with structural-functionalists (Wallerstein 2001: 29-37). World-systems are characterized by deep social cleavages that the capitalist seeks to exploit through the commodification process. Antisystemic movements "are themselves institutional products of the capitalist world-economy, formed in the crucible of its contradictions" (2001: 27). Resistance does not come from "outside" the world-system; it is an integral part of a relational world view.

> The three presumed arenas of collective human action—the economic, the political, and the social or sociocultural—are not autonomous arenas of social action. They do not have separate "logics." More importantly, the intermeshing of constraints, options, decisions, norms, and "rationalities" is such that no useful research model can isolate "factors" according to the categories of economic, political, and social, and treat only one kind of variable, implicitly holding the other constant. [Therefore] We are arguing that there is a single "set of rules" or a single "set of constraints" within which these various structures operate (Wallerstein 2000: 134).

Conceptually, Wallerstein's view seems to me more correct, since it is not clear how Amin will separate-out the logics guiding the actions of each structural mode. Wallerstein's claim in practice, however, will make the empirical analysis of specific historical situations much more difficult to engage, since he is calling for an approach that tries to account for as much of the whole as possible—a difficult task even after the most thorough historical research without some kind of methodological framework. That is the usefulness of Braudel's suggestion to analyze the relationships within and between different categories of historical time for the sake of manageable exposition. In this, he favoured the study of economic cycles of expansion and contraction.

Braudel's influence on world-systems analysis

Braudel provides the conceptual foundations for world-systems analysis. He was a key figure of the influential *Annales School* of history that rejected outright the traditional emphasis on politics and war in most historical narratives. Instead, he sought a more complete explanation of history that would include all the dimensions and aspects of human existence (Braudel 1980, *passim*; Breisach 1984: 374-5; Gilderhus 2000: 116-7). Societies, he thought, were an assembly of interrelated parts that are themselves interrelated parts within a totality where a system's micro processes are continuously being organised under a system of macro processes—systems within systems, processes within processes.

To simplify Braudel's views Thomas Shannon in *An Introduction to the World-System Perspective* outlines three "dimensions" used by Braudel to analyse contemporary history (1996: 14). The *horizontal* dimension describes the world's economy as characterized by many different modes of production (Marxist usage) that relate to one another and fall under one larger "type of world economy" (1996: 14). That world economy has four characteristics: (1) it occupies a geographic space; (2) it has one economic centre, though two or more centres can exist simultaneously for a time before one dominates the other; (3) every world-economy has a centre surrounded by a number of peripheral zones; and, (4) the centre always subordinates the peripheries (1996: 13-5). The centre features countries with the strongest and most advanced modes of production, while the countries with the weakest and least advanced modes of production make-up the periphery. The tendency of core countries is to dominate and exploit the periphery, which essentially, though unwillingly, generates wealth for the centre (Braudel 1977: 89). Braudel's is a spatial model emphasising trading patterns financed with capital between city states and countries that are in various states of economic development. Braudel's views, however, do not reflect the more nuanced sociological views of Hopkins concerning core/periphery relations constituted by a multiple world-systems.

The *vertical* dimension envisions a three-tiered hierarchy. The bottom level, called the *material life*, is the level where the vast majority of people live their daily lives. It is this level that capitalists endeavour to dominate and exploit in their efforts to accumulate their wealth. It provides the cheap labour and resources, but can never be fully commodified. The middle layer is the *market economy* that represents the market and trade system characterized by "horizontal communications between the different markets: here a degree of automatic co-ordination usually links supply, demand and prices" (Braudel 1984: 229). It is a relatively "transparent" layer of economic activity that mostly involves the producer directly and transactional outcomes are fairly stable and predictable (Braudel 1977: 50). The final layer, what Braudel called the *anti-market*, is the capitalist layer where a small number of capitalists collude with governments to operate above and around the workings of competitive market economies to maximize their investment income (Arrighi 2002: 10; Braudel 1977: 35). It is that arena "where the great predators roam and the law of the jungle operates, and this—today as in the past, before and after the industrial revolution—is the real home of capitalism" (Braudel 1982: 230).[10] Amin's later analysis also finds a distinction between economic and capitalist markets. The former is based on competition while the latter with the help of the state creates monopolies based on private property (Amin 1997: 15). The implication of distinguishing between market economies and anti-market forces is that market economies are viable without resorting to capitalist practices.[11] How that would be accomplished and whether it would result in ecologically sustainable practices is an open question.

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[10] Braudel distinguishes between capitalism and market economies that Wallerstein summarises with great clarity in *Unthinking Social Science* in chapters thirteen through fifteen. Amin makes the same distinction, suggesting market economies are necessary for the exchange of commodities, whereas capitalism is an ideology of accumulation and domination through political and not economic means (1997: 15).

[11] Braudel sees capitalism as the main problem facing the world-economy, arguing capitalism and markets are the complete antithesis of one another. The problems faced by the market system are because of the interventions of capitalists, not competition or trade (see Wallerstein 2001, chapter 15). This is not completely unlike Karl Polanyi's notion in *The Great Transformation* (2001) that the capitalist markets can be re-embedded or subordinated to or by the social realm. Though differently expressed, Braudel and Polanyi both seem to think that market economies can still operate to the benefit of people if the activities of capitalists can be regulated. However, while Polanyi thinks that markets are a separate component of the "social life of

The *chronological* dimension refers to the notion that there are multiple histories that unfold at different rates. Braudel notes in *The Mediterranean and the Mediterranean World in the Age of Philip II* that one of the problems in writing these types of social histories comes from "confronting every historical undertaking." He was asking whether it was ever possible "to convey simultaneously both that conspicuous history which holds our attention by its continual and dramatic changes [*l'histoire événementielle*]—and that other, submerged, history, almost always silent and discreet, virtually unsuspected either by its observers or its participants" [*histoire structurale* and *conjonctures*] (1995: 15). To his mind these opposing perspectives had contradictory goals. Therefore, the best way to study social history is to examine the different histories and then examine how they interact and impact one another. To simplify this form of analysis he divided "historical time into geographical time, social time and individual time" as a "means of exposition" (1995: 21). Moreover, since economic history is quantifiable it could more accurately reveal the relational-historical relationship between the physical world (nature) and the social life of social actors (1980: 48ff.). His choice, therefore, was to present history in its grandest scale, describing the processes of historical transformation while for the most part ignoring the history of events. This is a practice I will try to imitate.

Specifically, he identified three categories for studying the rate of historical transform: the concepts of the *longue durée*, what he called "the endless, inexhaustible history of structures and groups of structures" of history; *conjunctures*, the study of economic cycles and "intercycles;"[12] and the history of events (Braudel 1980: 74-5). Of the last Braudel was quite critical, arguing that the biographical history of individuals and events should not be the primary focus of historical study because of the greater impact of other "structural realities" (1995: 23).[13] For Braudel, men alone do not make their

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societies," Braudel argues that the evidence taken from history and the experience of our real lives tells us that the two cannot be separated (1982: 225-227).

[12] The history of *conjoncture* (economic cycles) is only complete " if in addition to the economic conjuncture one could have a study of the social conjuncture and all the other concomitant situations of the expansion or contraction. It is the weaving together of a variety of simultaneous conjunctures which would bring about a viable sociology" (Braudel 1980: 75).

[13] This is not a denial of agency: however, "it must be said that, in history, the individual is all too often a mere abstraction. In the living world there are no individuals entirely sealed off by themselves; all individual enterprise is rooted in a more complex reality, an "intermeshed" reality, as sociology calls it. The question is not to deny the individual on the grounds that he is the prey of contingency, but somehow to transcend him, to distinguish him form

own history; rather history also "makes men and fashions their destiny" (1980: 10). Social history interacts with a variety of 'other' histories that have their own structures, which in turn impose limits on our actions and to a degree condition our future. Accordingly, social history should be studied in relation to the rhythms and cycles of other histories. For example, the introduction of cattle into North America by the Europeans began a long process of ecological transformation taking hundreds of years that in turn affected cattle-raising practices, but this is not obvious in contemporary cattle-raising practices without examining history in the way Braudel suggests.

Environmental limits can also be understood by analysing the relationship between "geographical time" and "social time." We know that environmental integrity can be preserved when 'nature' is given enough time to adapt to the pressures of human interaction. We can study these limits relationally, so that environmental limits are understood not in relation to some unknowable pristine state, but by the intensity of the relationship between geographical time and human time. Though an oversimplification, if human practices follow the rhythms of geographical time the integrity of the environment would be preserved. Ecological stress, therefore, indicates a deviation from that harmony. Within the capitalist world-economy the *conjoncture* mediates the relationship between fast-paced and intense human activity and the long slow change of geography. When this relationship is quantified and compared with the historical record we can discern whether human activity is surpassing the capacity of 'nature' to replenish itself. In such a case, it seems to me that the role of innovation should be to close the gap between these different historical times. The question I raise is whether that can be done when human activity besides being constrained by geography is also constrained by the ideology of a capitalist world-economy?

One way to get at this social-historical change is by examining *secular trends*. These refer to the structures that cause phenomena by operating through the *conjoncture*. That is, structures cause change and are themselves changed by the cyclical rhythms of the conjuncture, which makes them useful for studying change over the *longue durée* (1980: 30). They are not limited to the structural processes of expansion, commodification,

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the forces separate from him, to react against a history arbitrarily reduced to the role of quintessential heroes. We do not believe in this cult of demigods .

and/or mechanization, but these are the main trends. Other analysable trends could be urbanization, population growth, or even time itself. Ultimately, secular trends reveal the world-system's trajectory by using narrative to describe what changes have taken place (Hopkins and Wallerstein 1982: 54-57, 64). In this project I am describing these secular trends in narrative form to see what patterns emerge in the world-system of the beef industry.

Thesis and Organisation

The greater the distance separating consumption and production, the less likely those consuming beef will notice or have to live with the direct consequences beef production has on local environments. When those distances cross over political borders, it becomes even more difficult to connect the damage done in areas of production to places of consumption. It is in those social spaces between local markets that capitalism exists and acts as the financier connecting consumption and production (Braudel 1977: 111). I am arguing that within the beef industry the historical evidence shows that once these commodity chains are established, and people become dependent upon them for their economic well being, innovation within the production process also become governed by the logic of capitalism that has since become a part of the social fabric. Therefore, the response to environmental crises is to introduce stopgap measures to ensure sustained levels of productivity. Historically, there have been a series of inadequate responses that have only deepened the social-ecological crisis.

More formally I intend to argue that within the capitalist world-economy since its beginning there has been a dynamic and generally antagonist relationship between capitalism and the finite limits of the biosphere that have led to cycles of environmental degradation and technological and managerial adaptations that result in the further deepening of the degradation. The consumption, production, and distribution of beef have undergone a number of changes since their introduction to the Americas in 1494 and a number periods can be identified: European expansion and the beginning of the ecological decline from 1494 to 1713; the impact of political transition from colony to

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. ." (Braudel 1980: 10). The historical goal is to present the history of structures over time.

country on cattle-raising from 1713 to 1842; the rise of Cattle Barons and Meatpackers from 1842 to 1920; economic and environmental crises lead to industrialised agriculture from 1920 to the mid-1970s. Within each period there has been the need to overcome some form of ecological limitation resulting from prior human actions. These actions result in unintended consequences that bring about new environmental contradictions, leading to the further deepening of contradiction within the world-system.[14] Less formally, I aim to show how the interactions between regional and global interests of the political economy result in environmental degradation.

Essentially, I organise this thesis according to the above periodization. Chapter 2 (1494-1713) identifies the changes in the environment from the point of view of geographical time and show how unintended environmental changes can be powerful forces for change that adds to the European's ability to settle in the New World. It illustrates how the environment shapes the lives of people over long periods of time without their recognising it in their daily lives. Chapter 3 (1713-1842) examines the interaction between cattle-raising and the ecology is impacted by Thomas Jefferson's notion of the yeoman farmer. Chapter 4 (1842-1920) represents an historical *conjoncture*. It was the convergence of economic, social, and geographical times that resulted in the first serious ecological-economic crisis in North America. Chapter 5 (1920 to the mid-1970s) describes how the beef industry restructured and reorganized in response to that crisis. It also shows how *corporate liberalism* emerged in America, which came with the notion that environmental crises like economic crises could simply be managed. I will argue that they were managed in particular ways to continue the systemic patterns of accumulation within the capitalist world-economy. This led to the Green Revolution since the 1940s, which brings us into the current economic phase. In chapter 6, I end with a brief overview of the trends affecting the current period before making some final remarks in the conclusion. There I will attempt to summarize the patterns of historical change and see whether they are indicative of future trends.

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[14] Periodization here does not reflect developmentalist ideas. It is only a means to enter into discourse in an organised way in the face of overwhelming empirical datum without having to recall the whole of human history. These periods, like the attempts of many others, are arbitrary and overlap one another on many levels.

CHAPTER 2 TRANSFORMATION AND INCORPORATION OF THE AMERICAS

> The emergence of capitalism signalled a quantum leap forward in the scale, scope, and speed of ecological degradation.
>
> Jason Moore (2003: 99)

Before the Europeans discovered the Americas in 1492 there existed two distinct co-evolving biotic systems that bore little resemblance to one another, a situation hard to imagine five hundred years on (Crosby 1994: 9-10). Cattle are not indigenous to the Americas, but to the Middle East where they were probably domesticated some 8,000 years ago for their milk in what historian John McNeill describes as "an extraordinary perversion of natural biological relationships" and secondarily as draught animals (McNeill 2003: 31). Cattle were ferried here by the Spanish seeking to settle the Americas for the purposes extracting gold and silver to pay off debts owed to Dutch and Genoese financiers.[15] This need for bullion meant Spain needed to risk exploring the Americas (Wallerstein 1974: 168-9). The Americas were the new factor in the sixteenth century, injecting new life into the European economy, although trade in the typical sense was not what the Spanish sought with Amerindians; rather, they sought to exploit its wealth and people for the benefit of Europe's upper classes (Beaud 1983; Crosby 1994: 84-5). During the sixteenth and seventeenth centuries, Europe's upper classes were in financial need and looking to benefit from the emergence of new technologies. Access to new territories, like the Americas and India, gave them with the incentive to broaden their search for more precious metals (Beaud 1983). It was a time of mercantilism[16] that would eventually transform itself into a post "industrial revolution" form of capitalism in the nineteenth century (Amin 1996: 62-3). Yet, that was not the only reason for Spanish expansion. Spain and Britain were both experiencing serious environmental problems related to deforestation and overgrazing related to cattle-raising practices (Rifkin 1992:

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[15] Spain was overextended and lacked the State structures necessary for maintaining an empire. That resulted in recurring indebtedness to foreign sources that left Spain broke. From this the Dutch emerged as the hegemonic power in Europe after the Treaty of Westphalia in 1648 (Arrighi and Silver 1999: 43; Wallerstein 1974: 191, 196, 213).

45). Something had to be done; and as we shall see, cattle became an important force in Europe's need to expand its territorial boundaries. Unforeseen, but more importantly, cattle would play an enormous role in the transformation of the Americas' ecology, making European expansion more certain. The discovery of the Americas added to the ability of the Europeans to expand their economies, and there can be no doubt that this discovery would become an "ecological windfall" providing Europeans with an abundance of fresh "natural capital" for their use (Steinberg 2002: 37), especially for those in the upper classes in a position to exploit the situation.

Not unexpectedly, Spanish explorers brought with them what they considered the material necessities needed to survive in a foreign landscape. Consequently, on 2 January 1494 Columbus off-loaded an unknown number of cattle onto the island of Hispaniola[17] (Rifkin 1992: 43; Slatta 1990: 9). Without realising it, the introduction of cattle would help the Spanish to replicate existing social relations found in Europe. Europeans, consciously and unconsciously, worked to reproduce similar lifestyles to those back home in Europe. Territorial expansion, therefore, depended very much on the capacity of newly incorporated areas to produce the same kinds of commodities that were in demand back in Europe (Crosby 1986: 296-8). They showed very little interest in adapting their diet to the "ecologically benign" indigenous species of the Americas (McMichael 1993: 223). The result was unprecedented environmental change. Changes so extensive they would later necessitate the introduction of a variety of adaptive strategies to ensure the socio-economic presence and productivity of cattle in the New World. The consequences to the environment were initially unintended, but dramatic. No one at the time could have known how outrageously successful the transplantation of cattle to the West Indies was going to be (Jordan 1993: 70), or how damaging.[18]

Robert Clark in his book *Global Life Systems* has argued that the global human presence was dependent upon the simultaneous globalising of many other species. Life,

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[16] The Age of Mercantilism is roughly dated from 1600 to 1750, and was primarily promoting a set of "state polices of economic nationalism and revolved around a concern with the circulation of commodities" (Wallerstein 1980: 37).

[17] Today the island is divided into the nations of Haiti and the Dominican Republic.

[18] Crosby writes in *Ecological Imperialism* that the European contact with the Americas began a process that "Europeanized" the landscape through a process of "continual disruption" (1986: 291). This process most likely began in the summer fishing camps along the northern Atlantic coast when the

he claims, emerges symbiotically and spreads concurrently across the globe (2000: 3).[19] Whenever and wherever different biotic systems come into contact with one another a hybridized ecosystem emerges; a process, Clarks adds, usually driven by the wants and needs of people (2000: 21). In the case of the Americas, its biota was inferior to that of the much hardier biota of Europe (Crosby 1986: 274), so when the Europeans brought the two together, especially with the introduction of cattle, pigs, and sheep it resulted in the most significant changes in the North American ecosystem since the Ice Age (Clark 2000: 16-7).[20] Similarly, William McNeill describes socio-political change as a result of contact between groups with a disparate sets of skills where the group with the higher set of skills is imitated by the group with the lower set of skills resulting in patterns of "skill-diffusion" that push history in a single direction that becomes more homogenised over time (McNeill 1990). Once an 'edge,' even if slight, has been established by one system over another the disparity will grow and transform the 'weaker' system (Wallerstein 1974: 98). Clearly, the Americas experienced the overwhelming effects of European life and it hardier biota.

Similarly, Chase-Dunn, Hall and Chew are in general agreement that the historical relationship between societies and nature is dynamic and one of constant conflict.[21] These clashes greatly influence the processes and patterns of accumulation and dramatically impact how societies socially and materially reproduce themselves (Chase-Dunn and Hall 1997: 71; Chew 2001: 2; 2002: 218). That relationship is often antagonistic, but always interdependently relational and very reliant on how the people exploiting nature are socially organised. The interaction between them "condition" either the growth or the demise of human communities (Chew 1999: 88).[22] For Chew this

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first European's brought "weeds," probably unintentionally to North America, though it was not until after the settlements at Jamestown that "weeds" for forage became abundant in the colonies (1986: 155).

[19] This is very similar to the circumscription hypothesis that claims the growth in availability of food sources results in the population growth that puts extra pressure on local resources. If new land is available where people can maintain a similar and familiar lifestyle they will migrate (Chase-Dunn and Hall 1997: 45).

[20] Alternatively, Andre G. Frank writes *ReOreint* that the most important political-economic aspect of the Columbian Exchange was the movement of gold and silver to Europe and into circulation into the world-economy (1998: 60); however, Frank completely ignores the affects of the ecology on the political economy in his discussion of the World System.

[21] Chew's view is complicated by his adherence to Andre Frank's view that capitalism extends back 5000 years.

[22] As for Clark's globalization of life hypothesis, he sees the relationship between societies and nature "governed" by the rules of different human ideologies (Clark 2000: 174). He does not unfortunately tackle the social issues surrounding this claim in any depth, but an example might be how the

relationship extends back throughout all of social history, and in his view the "ecological relation is as primary as the economic relation in the self-expansionary processes of societal systems" (Chew 2001: 2).[23] A relationship that is often typified by what Braudel depicts as a struggle for survival fought against two enemies: the scarcity and inadequacy of the food supply and disease (Braudel 1981: 90). It is arguable, therefore, that without cattle and other stock animals Europeans would have been incapable of sufficiently transforming the land or even soon enough for them to benefit from the exploitation of precious metals that were so important to the political economy of Europe at that time. Had that been the case, they may have had to seek their riches elsewhere.

Contradiction in Europe: 1494 to 1710

At the beginning of the sixteenth century meat consumption in Europe began to decline among the general populous. From then to the eighteenth century, the diet of the average European was essentially vegetables, whereas prior to the fifteenth century meat was more abundant and served with vegetables (1981: 105, 190). This and other historical trends show general declines in the standard of living in opposition to increases in Europe's population. Typically population growth is normally accompanied by economic growth, which is associated with improvements in the quality of life; yet, most sectors of Europe's economies were in general decline with the exception of beef and a growing textile industry based on wool. Beef prices generally rose from 1550 to 1850, while wheat prices were trending downward making it the food of choice for poor people.[24] By 1785 the demand for wheat by Europe's poor and the need for more fodder

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impact the notion of private property or the commercialisation of land would effect the distribution or use of nature within human societies; and he certainly does not talk about the contradiction between societies and nature brought about by the structural processes of accumulation within a capitalist world-economy.

[23] For Chew the ceaseless accumulation of capital is "self-defeating" because it is always bounded and in contradiction with nature; and since nature dictates the limits of capitalist expansion, it therefore defines "the historical tendencies of world system evolution" and its patterns of accumulation (2000: 216). It is a history of exploitation to meet the materialistic needs of society, particularly as they become more urbanised the demands on nature increase, which in turn impact social organisation and reproduction (2001: 1-3). Capitalism is the accumulation of surplus and is dependent on the technological and socio-cultural circumstances at the time. This relationship is constrained by population growth, which is a variable that determines the sustainability of nature that in turn is determined by nature (2000: 217-8). Braudel has similarly suggested that there is a link between population growth and local climates mediated by human agricultural activity (1981: 49ff.).

[24] There is an irony here in that it was the increased demand for beef that led to an increase in grain production and the resulting price trends (Braudel 1981: 124). There was a long process of experimentation over the centuries led Europeans to cultivate wheat because wheat "devours the soil," which needs to be rested regularly, and that gave the Europeans the opportunity to continue to raise livestock (1977: 15). So, since wheat cannot be grown on

for cattle resulted in a agricultural crisis. A vicious cycle ensued—less fodder means less cattle, which in turn means less manure to revitalize the soil that the wheat were grown in, and that meant reduced crop yields. The social impact was immediate: a rapid decline in employment and increased begging among the lower classes. The situation further deteriorated for the poor and the ecology because of the growing demand for beef by the aristocracy. Higher prices were the result, giving cattle producers the incentive to convert of more of the commons to pastureland (1981: 196).

The *enclosures* movement beginning in fifteenth and sixteenth centuries in Britain and Spain began as an effort to ensure the continued economic growth of the cattle and sheep farming sectors in a period of economic decline (Wallerstein 1974: 108-9; 1980: 121).[25] The enclosures were ultimately a disaster for the working poor, but essential for the formation of a small merchant class organised around property rights.[26] The result was a boon for them and the aristocratic class as demand for beef and wool generated price increases. On the downside the enclosures led to more intensified land use practices. The expropriation of the commons by the upper classes continued throughout the seventeenth century leaving peasants with less of the commons for pastureland (Wallerstein 1980: 15).[27] By the time of industrialisation in the nineteenth century, meat was an expensive luxury, and it was not uncommon among the working class households for any available meat to go to the males while the women became virtual vegetarians as

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the same piece of land two years running without seriously depleting the soil, land needed to be rotated on a three year cycle between wheat, oats and fallow, during which cattle were grazed (1981: 114). This was an intense process requiring the use of cattle manure to fertilise and sustain this process (1981: 115-6). Jason Moore goes so far as to argue that the rotational system itself causes environmental degradation because it reduces the need for cattle and thereby reducing the availability of manure to replenish the soil (Moore 2003: 108). In fact, between 1600 to 1699 crop yields fell slightly in Western Europe, but more significantly in the rest of Europe because of the lack of sufficient quantities of manure led to cost increases for manure that apparently were not worth the rising costs to producers and therefore led to declines in grain yields (Wallerstein 1980: 14n10).

[25] Rifkin is more specific, and dates the beginning of the enclosures starting during the 1530s in Britain (1992: 108).

[26] The enclosures culminated in the general Enclosure Act of 1801 when land and titles to land were finally privatized for commercial use and became a commodity (Polanyi 2001: 189). They were initially of benefit to small individually owned operations, and they provided some employment to people thrown off the land, but when the land was enclosed for pasturage for cattle and sheep it took away the poor's "share in the common" while the aristocracy used the land to exhaustion for the sake of profit (Polanyi 2001: 36-37; Wallerstein 1980: 15).

[27] In seventeenth century Europe soils were wearing-out, yields were low, and half the arable land lay fallow in southern Europe and about a third lay fallow in northern Europe (Beaud 1983). This is in part be due to the lack of technological change in agricultural practices between 1500 and 1800. During that time the only real economic growth in the agricultural sector came from absolute gains in keeping-up with population growth (McNeill 2003: 201)

a matter of circumstance (Ross 1987:22-3, 28).[28] Fresh Meat became the daily fare of the upper classes, while the poor subsisted on a diet of salted beef (Braudel 1981: 106, 197-8).[29] The quality of diets was becoming increasingly polarized across class lines (Ross 1987: 35). A situation that would not improve until meat was imported in large quantities from the United States starting after the mid-nineteenth century (Braudel 1981: 105).

This was quite different from the situation that was common in the Middle Ages, when meat consumption throughout the population was more plentiful and the standard of living higher (1981: 193). This abundance was due to the rise in agricultural production during the thirteenth century driven by a growing population.[30] It was a period also characterized by increased deforestation to make room for more pasturage (Ross 1987: 25).[31] So in England, while it may have been the case that some people were enjoying a higher standard of living, it was at the expense of the land. Europe's agricultural yields per acre had declined by one third between the fourteenth and fifteenth centuries (Moore 2003: 110). The response of the British government was to incorporate more of the rural pasturelands of Ireland[32] and Scotland and have them produce meat for the market system. This intervention disrupted the social life of the commons. Meat consumption began to decline in the rural areas as it was shipped off to England for consumption by the upper classes. By the 1800s the poorer classes were essentially subsisting on a diet of potatoes, cheese, milk, and some grains, while export markets for their main product—beef—and the clearing of land for cattle-raising continued to grow in those regions right up until 1910 (Ross 1987: 30-1). None of these actions were done to meet the needs of the poor, but to meet the demands of the upper class (Braudel 1995: 403; Wallerstein 1974: 56). It was an unrelenting and accelerating era of commodification resulting in a decline in traditional forms of communal pastoralism on the commons (1974: 101-2). From the fifteenth century onward these conditions deteriorated because of poor agricultural practices that were exhausting the land. This motivated Europe's upper classes to seek-out more resources in other parts of the world. The fortuitous discovery of the Americas would ease those problems and lead to its colonisation and the exploitation of its resources (Wallerstein 1974: 57; Rifkin 1992: 32).

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[28] Braudel notes the social adaptativeness of European societies to the changing conditions of people's relationship to the economy and nature. Throughout the period there is a concurrent and continuous rise in the number of fasting days on the Christian calendar up until the mid-seventeenth century as meat consumption continued to decline and fish consumption grew commensurate with the rise in merchant fleet operations and the continued exhaustion of the land (1967: 146).

[29] Most of Britain's poor were eating sun-dried beef imported from Brazil and Argentina (Braudel 1981: 201), a region playing a large role in the feeding of Europe resulting in the clearing of approximately 12 million acres of rainforests by 1709 (Chew 2001: 126).

[30] This situation would change with the arrival of the Black Death in Europe around the mid-fourteenth century.

[31] Incidentally, this deforestation was also commensurate with the shift of pigs to urban areas by the fifteenth and sixteenth centuries (Ross 1987: 25)

[32] During this period, 50 percent of Ireland's croplands were converted into pastureland to satisfy English markets (Rifkin 1992: 57).

Historically, the distribution of stock animals in Europe developed over long centuries of trial and error. Pigs which were generally ubiquitous throughout Europe were becoming a nuisance to crop farmers because of their scavenging nature, so by the sixteenth century they were forcibly confined to urban centres to keep them away from the countryside. In contrast, sheep and even more so cattle needed lush grasslands. Consequently, it evolved that sheep thrived in the hotter harsher climes of the Mediterranean and Southern Europe while cattle faired much better in north western parts of Europe because of the availability of lush pasturelands, most notably in Britain (Ross 1987:24-5). However, cattle-raising was not confined to Britain. Western and southern Spain, north-western France, southern parts of Scandinavia, parts of West Africa, and the plains of central Europe[33] were also home to large, growing cattle-raising traditions (Jordan 1993: 15-6). By the sixteenth century, cattle-raising was emerging in Europe as a regional specialization intended for exchange in Europe's marketplaces (Wallerstein 1974: 108).

These developments tended to organize in particular spatial patterns. Cattle-raising seems to occur mainly in the economically underdeveloped areas furthest away from urban centres. Historian Terry Jordan writes in *North American Cattle-Ranching Frontiers* that cattle-raising in Europe generally fits this spatial pattern and is not wholly inconsistent with economist Johann-Heinrich von Thünen's notion of the Isolated State. Von Thünen theorized that all other things being equal cattle-raising would always occur at the 'fringes' of society because of the relationship between the cost of land and transportation.[34] That is, the further away from the town (and hence the only market) one moves land prices decline in relation to higher transportation costs. So for production to be profitable, it must balance these costs with projected outputs. Therefore, in the case of cattle, since it needs more land to produce meat in sufficient amounts at affordable prices for the townspeople to consume, and since cattle are for the most part self-transporting, the cheapest and most efficient spaces for capitalists to invest in cattle production is in those areas furthest from the town. Jordan thinks it is an overly simplistic theoretical model because it is an incomplete explanation for how these patterns develop (Jordan 1993: 308). It is an abstracted, ahistorical, and static description that does not take into account soil exhaustion and/or overgrazing, which are also factors in spatial expansion.

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[33] When "cattle-breeders" in Hungary saw the rising demand for beef in western Europe the conditions were right for them to use their own fields for grazing while buying their own foodstuffs from elsewhere (Braudel 1982: 293). Braudel does not say who the cattle-breeder was. His narrative implies that it must have been people with the wherewithal to transform local markets into a mode of production for capital gain. I doubt it was the actual farm worker to which he is referring.

The move toward regional specialization in agriculture between the fifteenth and seventeenth centuries in Europe was changing the role of labour and their relationship to the land. The increased opportunity for profits increased the involvement of the upper classes in agricultural production, prompting the owners of cattle-raising operations to increase their levels of productivity. The mutually supportive relationship between grains (especially wheat) and cattle began to be abandoned deepening the ecological crisis (Moore 2003: 124). There was now widespread soil erosion and exhaustion and deforestation in all the different agricultural regions of Europe (Moore 2000b, 2003; Wallerstein 1980: 132-3). Concurrently, people living at the "fringes" where there was already less market activity were increasingly marginalized. Few employment opportunities meant there was downward pressure on labour to accept lower wages and a lower standard of living. This is roughly consistent with Von Thünen's model, and reflects how "market principles have linked city with country to run a natural landscape into a spatial economy" (Cronon 1991: 52). However, simply stating that market principles are linked to geographical spaces does not reveal the mechanism that drives the expansion of a capitalist world-economy or how that relationship results in deepening environmental degradation.

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[34] His model depends upon certain assumptions that can be deduced from his Introduction. The town must be completely isolated from the rest of the world and self-sufficient; it must be surrounded by wilderness that has similar weather patterns and soil fertility, the lay of the land must be the same throughout so as not to effect transportation costs, and finally all actors must act on the utilitarian dictate to maximise profits (Von Thünen 1966: 7-8; ch.

Relevant Theories of Social Change

Sociologist Giovanni Arrighi argues that change occurs in the capitalist world-economy because some “agent or an ensemble of agencies” act to expand the trading system by introducing new “inputs and outputs” and/or new suppliers or customers to the system (Arrighi 1994: 223-224). This competitive expansion initially serves to maintain the level of profit for investor that in turn ensures their continued participation resulting in the continued expansion of the system. However, this growth cannot be sustained indefinitely because the continual reinvestment in the expansion of the system leads to too much competition resulting in a crisis of profits. That is, profit margins decrease in relation to the intensity of competition. These circumstances periodically require the processes of accumulation be reconstituted in a different form if the accumulation of wealth is to continue (1994: 226). The idea is that there are recurrent cycles of expansion and restructuring that deepens the commodification process as states or business organisations or both act to maintain profit levels. Every new expansionary phase attempts to reorganize in response to the unintended outcomes of the preceding period of expansion and restructuring by creating or reorganizing social structures so that capitalist accumulation become a part of the very fabric society’s structural organisations (1994: 8-10). Arrighi writes elsewhere “systemic reorganization promotes expansion by endowing the system with a wider or deeper division of labour and specialization of functions. Emulation provides the separate states with the motivational drive needed to mobilize energies and resources in the expansion” (Arrighi and Silver 1999: 30). Unfortunately, this explanation focuses on the political economy without showing how those business cycles change in relationship to geographical expansion or ecological degradation; therefore, Arrighi’s *systemic cycles of accumulation* can only be part of the story.

Likewise, there are problems with John Bellamy Foster’s interpretation of Marx’s rudimentary notion of *metabolic rift*.[35] Founded on Marx’s understanding that capitalist

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26). However, Von Thünen was aware of these shortcomings, but he quite clearly thought those more involved calculations would demonstrate the applicability of the model (1966: 171-4).

35 In Tucker’s translation of Marx’s Capital he translates *Stoffwechsel* as “material reactions” (344) and “exchange of matter” (349), but the common translation of *Stoffwechsel* is ‘metabolism,’ hence Foster’s use of metabolic rift (Marx qtd. in Tucker 1978).

social relations create a 'rift' between society and nature. "Metabolic rift" occurs when the countryside becomes an area of production supplying cheap food to urbanised wage labourers (Foster 2000a: 141-177). In Marx's view, the pressure to supply towns often prevents a balanced approach to cultivation because their relationship to one another is based on the logic of capitalist production (Foster 2000a: 144ff.; also see Marx in Tucker 1978, 344-351). Urban areas often concentrate populations for the sake of industrial activity, and have no relationship with the capacity of surrounding lands to sustain that population. The capacity to sustain agricultural production depends upon the condition of the land. Some of those lands may be quite distant, and in that sense there may not be any direct dealings between town and country, only the transfer of surpluses from the land to the town. The new science of soil management emerging in Marx' day recognised that the soil needs constant attention if it is not to be depleted. When it did become depleted, if at all possible, it was abandoned.

In my view, Jason Moore has the more sophisticated concept, what he calls *systemic cycles of agro-ecological transformation*. His explanation of change builds upon a synthesis of Arrighi's *systemic cycles of accumulation* and Foster's *metabolic rift*. He links the economic cycles of expansion and contraction of the political economy to the limits of soils to sustain ongoing nutrient depletion. By doing so, Moore contends that the capitalist adapts to each break in the nutrient cycle by reorganizing itself and expanding geographically (Moore 2000a: 137). For instance, if the capitalist were to invest in a farm that needed to have its soil revitalized, the costs of production would increase and he or she would earn lower rents for the land. Therefore, the most logical and cost-effective next step for the capitalist is to move production to a more fertile location without regard for the ecological consequences. In other words, nutrients used in the production process in the periphery generate surpluses that accrue to the core, and it is this "ecological contradiction" that necessarily pushes the world-system "to a progressively wider sphere" (2000a: 126).[36] The implication is that once geographical expansion reaches its spatial limits an "eco-historical crisis" must follow (2000a: 137). However, in the sixteenth century that scenario was not on the horizon, but the subsequent need to expand and colonize other territories becomes obvious as Europe's agricultural conditions continued to deteriorate. The progressive movement of cattle to outlying areas away from social centres was subject to pressures from farmers because of their need to escape worn-out pasturelands (Crosby 1986: 179). Moore's view successfully links social spaces to production and consumption.

More generally, Moore's view is that environmental degradation is inherent in the logic of capitalism. In response to recurring historical crises a restructuring and reorganization phase was necessary, and nearly always resulted in the implementation of solutions designed to ensure the continuation of the commodification process of land and labour. Likewise, sociologists Stephen Bunker and Paul Ciccantell both see environmental degradation as one of the structural features of an expanding capitalist world-economy. *Systemic cycles of agro-ecological transformation*, therefore, describe the ongoing interactive relationship between nature and a capitalist mode of production. Faced with this problem, the political survival of any government in the interstate system demands they organise to secure and protect access to cheap resources from the periphery (Bunker and Ciccantell 1999: 107-8).[37] As a result, capitalists collude with governments to legitimate their practices within the capitalist world-economy (Wallerstein 1992: 584). As the power of the state increases, economic issues take on increasing importance (Hall 1989: 243). There can be little doubt that the crisis in material needs; the crisis in seigniorial revenues, and the growing availability of capital became reasons for the European expansion (Wallerstein 1974: 48-9). The unintended consequence of this arrangement is a deepening of the contradiction between nature and society.

The relevant point is that the spatial expansion and ecological degradation are internally related structural issues, and by extrapolation, there can be no environmentally friendly form of capitalism because of the competitive need to find more cost effective and efficient means of production. For cattle-raisers to improve their levels of productivity in an effort to maintain profitability requires the continuous intense use of

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36 Foster and Moore periodize the origins of metabolic rift differently. Foster puts it in the nineteenth century during the Industrial Revolution, whereas Moore locates the origin of metabolic rift at the beginning of the capitalist world-economy during the long sixteenth century (Moore 2000a: 127; 2003).

environmental resources that can only be sustained by externalising many of those environmental costs. The main strategy in this period, therefore, was to move production to new geographical location. Clearly, relocating production rather than revitalizing *non* or *under* productive land was the more cost effective alternative, but is itself a future source of contradiction when productive pasturage is no longer available. These cycles of exhaustion and expansion were creating openings for financial "middlemen" to commodify the cattle-raising process. Though this process was contested, it was becoming a financial necessity for cattle-raisers to satisfy the demands of market forces than sustain communities or nurture the land.

Spain's Growing Empire and the Colombian Exchange

The spread of crops, domesticated animals and disease are often underrepresented and their impact underestimated in historical texts on social change, though they clearly influence the direction of society (McNeill 1990: 20). In a capitalist world-economy where consumption and production are increasingly separated by geographical distances, the real costs of trade to purchasers are negligible (Wallerstein 1979: 28). Those living in the richer core are not generally exposed to the social and ecological costs of cattle production. Those costs mostly accrue in the periphery where social and ecological issues at the sites of production and processing of cattle become marginalized, and for the most part exist outside the more immediate concerns of people living in the core. In these early days capitalist mode of accumulation was affecting the cattle-raisers ability to continue traditional practices. They depended on the "rotational" system to maintain the vitality of their fields and pastures. When that no longer worked or was not practiced properly, cattle-raisers moved about on the commons to better pasturage. That access was changing under capitalism. The land was deteriorating under the enclosures system because of changing notions of private property, increased specialization in labour and land-use, and the demand to raise productivity. Arguably, without the discovery of the Americas, the efforts by Europe's monarchs to strengthen their political power would

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[37] They suggest three strategies for doing this: (1) take-over "resource-rich peripheries, or (2) develop new technologies, or (3) coerce the resource periphery to assume the costs of up-grading their own systems of production to ensure the core's access to their goods by promising those in the periphery that they will have continued access to the core's markets (Bunker and Ciccantell 1999: 108-10).

have collapsed as its agricultural base continued to erode. Capitalism may never have taken hold.[38] Still, with the exception of Spain's limited presence, other Europeans did not hasten to take immediate advantage of this discovery, mainly because the technology of the day, especially in transport and communications, were not up to the task (Wallerstein 1974: 349). The ability to establish commodity chains was still limited. More to the point, the exploitation of land and people in the Americas was not possible without the capacity of states to dominate, and as a practical matter that was not yet possible for the Europeans. Nevertheless, the Spanish took the first steps by unintentionally exposing the Americas to the unrecognised and inconspicuous transformative powers of stock animals, which would become an unwitting aide to the growth of the capitalist world-economy.

Frontiers, Incorporation, and Commodity Frontiers

Frontiers are that "region just past the contrived political markings of 'borders'" where the rules of different systems are exposed and contested (Carlson 2001a: 246). Moore defines a frontier as a "*zone beyond which further expansion is possible*" that is a "specific kind of space defined by the forward movement of the (capitalist) system" into areas where commodification is still possible (Moore 2000b: 412). Wallerstein does not elaborate any notion of a frontier. For him it was enough to describe *incorporation* as the assimilation or overthrow of competing world-systems (Wallerstein 1979: 27). Any spaces beyond those boundaries were called the *external arena* that he refers to as "that zone outside but adjacent to the boundaries of the world-system" (Wallerstein 1989: 167). Despite Wallerstein's lack of discussion about frontiers, they are an important conceptual tool that may be used to describe zones of contested activity, where territory is eventually brought under the control of a world-system; and in this case, under the auspices of the capitalist world-economy. Neither does Wallerstein dwell on the actual processes of incorporation. For him it is enough to understand that a new "geographical location" becomes part of the capitalist world-economy when the socio-economic parts of that area become an integral part of the production process—a commodity chain—that responds to fluctuations in market activity that exist in some other core area of a world-system (1989: 130). It is a process that by definition requires newly incorporated areas to adopt the political structures of the interstate system and either become a state in the interstate system or be subsumed under the incorporating polity (1989, 170). By avoiding the particulars, Wallerstein has opened himself up for criticism being vague, especially by sociologists Thomas D. Hall and Christopher Chase-Dunn (Chase-Dunn and Hall, 1997; Hall 1989, 2000). They describe a frontier as a "social relationship worked out in space" (Chase-Dunn and Hall 1997: 70). Together they have developed a more detailed and comprehensive view of how weaker world-systems are incorporated and dominated by stronger world-systems.[39] The presence of cattle in the Americas was part of that process. European livestock were often stronger and out-reproduced the local biota of the Americas (Crosby 1994: 10).

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[38] Wallerstein and Quijano have written, "The Americas were not incorporated into an already existing capitalist world-economy. There could not have

The drive to incorporate external areas is not merely a matter of interest, but essential to the growth of the capitalist world-economy (Wallerstein 1983: 39). Establishing settlements on the island of Hispaniola would be the first of many steps of incorporating the Americas. Besides the desire to find and exploit gold and silver deposits on behalf of the Spanish Crown, the early economic life of local communities in the Caribbean was dependent upon controlling food sources. Cattle played a dominate role in this respect, the control of which was characterized by three main issues: (1) the proliferation of stock resulted in large feral populations of cattle that were difficult to control, (2) those newly arrived Spanish with the power and authority worked "assiduously to monopolize" cattle production and trade, and (3) these same local Spanish authorities tried to ban the exportation of stock animals off the island in an effort to maintain their monopoly in cattle production within the Caribbean region (Slatta 1990: 9). Control of cattle stocks

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been a capitalist world-economy without the Americas" (qtd. in Moore 2000b, 429).

[39] Hall and Chase-Dunn have written on this subject fairly extensively, and have developed a moderately complex theory of incorporation. Suffice to say they both agree that incorporation occurs at three levels: local, regional, and global (Hall 1989: 24, 240; 2000; Chase-Dunn and Hall 1997: 70ff.). The success of the incorporating process depends upon (1) the relative strength between the two system, i.e., the stronger the state the more drastic the change, that (2) the level of socio-political development effects incorporation, that (3) incorporation is a "variable and volatile" process, and (4) that there are many factors that affect the incorporation process (Hall, 1989: 241-2). Also incorporation occurs across a continuum of activity ranging from anywhere from weak to strongly incorporated areas depending upon the circumstances (Chase-Dunn and Hall 1997: 61). Carlson, on the other hand, has a more conciliatory view toward Wallerstein, though he himself defines six zones of incorporation: the core, semi-periphery, periphery, incorporating

was an essential element of maintaining power and control within the settlements. In all practicality, livestock were the only real source of wealth and power in the New World. The problem for stockowners was that creating and maintaining monopolies was difficult because of wide availability of land suitable for pasturage and the large number of animals (White 1991: 17-8).[40] The ability of cattle to survive in the West Indies assured their capacity to multiply. In the meantime, however, cattle were causing "severe" ecological damage wherever they were pastured. By the 1570s many native grasses had become extinct because of the feeding pressures put on indigenous flora by cattle (Jordan 1993: 71). Nevertheless, the key benefit of European expansion into the New World was that it strengthened the hold of the capitalist mode of accumulation in Europe. With the ability to grow and expand trade in the Americas, the future of the capitalist world-economy was now secure (Wallerstein 1974: 86). Europeans were now able to shift their growing agricultural problems to the Americas without having to reorganize or rethink the inadequacy of subjecting agriculture to market forces.

To understand the process of incorporation better, Jason Moore has developed the very useful concept of *commodity frontiers*. Unlike commodity chains, which analyse the production process starting with a finished marketable product—such as a beef roast—and then "trac[ing] back the set of inputs" (Hopkins and Wallerstein 1982: 60), a commodity frontier focuses on the input end of a commodity chain and 'tracks' the frontier's expansion at the level of the "raw" materials. This level of analysis provides a different perspective that does not always reflect the more generalised collective actions taken by governments (Moore 2000b: 410). By studying the economic activities and trends of cattle production, it is then possible to examine and understand the activities and assumptions driving the system at the State level (Carlson 2001b). Besides mining

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zone, eternal arena, and zone of ignorance. These categories, however, do not represent discrete progressive stages, rather a seamless 'grooming' process that begins in the external zones of ignorance where existing world-systems are 'progressively conditioned' to the logic of capitalism (Carlson 2001a).

[40] According to Braudel a monopoly depends on (1) the involvement of the state, (2) access to capital, banking, credit and customers, and (3) some distant zone of trade to be exploited (1982: 444), and it seems that Slatta's observation of the situation on the ground in the Caribbean could not meet the standard for creating a monopoly. Though the may have given legitimacy to the Spanish authorities in the islands, it could not enforce its will through military power, and second the oversupply of cattle in the region could not be exploited fully because of the lack of technology in the areas of storage (fresh meat was what was in demand, not pickled beef) and transportation. This situation would not change until the 1870s after the invention of ice packing and refrigeration..

and later the fur trade,[41] cattle-raising represented a primary transformational force in the incorporation of the Americas into the capitalist world-economy. It is evidence for Clark's hypothesis. Incorporation was occurring because of the adaptability of cattle and the desire of Europeans to "mimic" what they thought was best about the European lifestyle in the New World (Crosby 1986: 296-8). A commodity frontier adds a sociological dimension to historian Richard Slatta's notion of *cattle frontiers*, which he defines as those "sparsely populated areas, remote from political and population centres, where the legal and illegal slaughter of livestock provided the main source of income and employment" (Slatta 1990: 6). While this may be a useful spatial and/or ethnographic approach for describing locale conditions, which is how he uses it, it does little to connect the frontier experience to larger historical transformations within the world economy.

Spain in the Caribbean

Official sources reveal that cattle spread quickly: reaching Panama by 1510, Mexico by 1519, taken there by Hernando Cortes, and by 1541 cattle had spread throughout all the settlements in the colonies of Argentina, Peru, Chile, Columbia, Venezuela, and Brazil by 1550 (Slatta 1990: 10). Within twenty years cattle were not only established, but thriving in a way that could not have been imagined. For the Conquistadors that followed behind them, they found familiar food sources that made their struggle for survival in the New World less worrisome. Cattle became a "mobile larder" that was without competitors or predators (Weber 1992: 27). Around this lifestyle emerged a type of pastoral nomadism form of ranching that may explain why cattle-raising instead of crop farming became more important to later Spanish settlers (Hall 1989: 53). By 1600 wherever Spanish settlements had taken root they were tending domestic herds of cattle that were in turn surrounded by much larger feral herds of livestock, which by mid sixteenth century were grazing across *Las pampas* and the *Rio de la Plata* in Argentina, in many parts of Central America, and well into the northern regions of Mexico (Crosby 1994: 33).

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[41] The first beaver furs started arriving in England in the 1580s, almost 90 years after cattle (Clark 2000: 184), and resulted in the formation of the Hudson's Bay Company in 1679 (McNeill 1991: 657).

The difficulty of establishing cattle-raising monopolies outside settled areas was even more pronounced than the problems within those areas. This was further complicated by the illegal trade from the mid-seventeenth century to the early eighteenth that resulted in the Spanish Crown losing much needed revenues (Slatta 1990: 16). This illicit trade flourished as cattle became more abundant throughout the Caribbean. Spanish officials even tried to cull feral herds in an effort to thwart poaching by buccaneers (Moore 2000b: 422)[42] who were trading in hides and tallow, while using the meat for their own consumption (Wallerstein 1980: 159). It was part of the political intrigue of the time. British, French, and Dutch rivals gave safe haven to these pirates and encouraged their contraband trade until Spain relinquished some of its territorial claims in the region (1980, 158).[43] Spain, and in particular the City of Seville, dominated the Atlantic trade from 1504 to 1650 (Braudel 1980: 91-2), after which, Spain lost its main prize—Jamaica—to the British in 1655 (Jordan 1993: 78). The Dutch, the hegemonic power of the time, were unable to enforce a monopoly using the West India Company and it soon lost-out to the British toward the end of century (Arrighi and Silver 1999: 105-9).[44]

The key to gaining control of the cattle markets in the Caribbean was the arrival of sugar. Unlike cattle, it was the only commodity in the Americas where demand outstripped supply (Wallerstein 1980: 162). Sugar was brought to the region by the Portuguese in 1520 from the Bengal region of India. It became an instant economic success, and soon dominated the regions economic priorities (McNeill 1991: 660) and was an early example of the systemic transfer of nutrients from the periphery to the core. As a single crop system of production the soils were soon exhausted, demonstrating the veracity of the theory of metabolic rift (Moore 2000b: 413). Sugar, therefore, was key to the development of the capitalist mode of accumulation from the sixteenth to the nineteenth centuries.

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[42] It was during this era in the mid-seventeenth century that the concept of the Barbecue originated with British and French pirates—a practice that remains very popular in North America's western and southern regions today. They would roast animals from the feral herds and then roast the whole animal over an open pit with a low fire on a spit (Jordan 1993: 77-8).

[43] One of the reasons for this interest in this region was Europe's inability to open markets in Asia (Frank 1998: 71).

[44] The Dutch West India Company established in 1621 traded in Spanish contraband and sugar production in Surinam, though its primary role after 1674 was trading in slaves. It was disbanded in 1791 because it could no longer compete against British interests (Arrighi and Silver 1999: 100-101).

Disease was the other effect of expanding cattle and sugar production. Europeans had had contact with cattle for thousands of years and had built-up a genetic tolerance to the diseases associated with close contact with cattle. Human diseases like the measles, tuberculosis, and smallpox all have their genesis in our relationship with cattle (Diamond 1997: 207). The effects on local Amerindian populations were disastrous; and their numbers over the next one hundred years dropped precipitously due to these diseases.[45] The situation was made worse by a whole set of different diseases arriving with the African slaves (McNeill 1991: 600). The other reason for Amerindian decline was the damage done to local crops by cattle. As a result, Amerindians had less access to food, making them more susceptible to the European diseases now present in the New World (Hall 1989: 60; McNeill 1976: 174; Wallerstein 1974: 89). In the case of Hispaniola, the entire indigenous population was wiped-out by 1535 (Diamond 1997: 213) making it necessary to bring labour into the region in the form of slavery.

As slaves poured into the region in the seventeenth century and sugar plantations began to thrive, the British started their first large-scale cattle ranching operations to supply the plantations with cheap meat (Jordan 1993: 79). Cattle herds were allowed to freely graze around the plantations and were an addition to a diet of potatoes, bananas, rice, millet, and yams (Braudel 1982: 279).[46] Paradoxically, the growth in sugar plantations increased demand for more manure to fertilise the fields, which in turn led to further deforestation as more land was cleared, not only for more land for sugar plantations, but also for more pastureland (Moore 2000b: 424-5).[47]

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[45] Numbers seem to differ somewhat: Wallerstein's numbers suggest native populations estimated at 11 million in 1519 dropped to 1.5 million souls by 1650 (1974: 89-90), whereas, Jared Diamond's suggest that when smallpox was introduced to the Aztec's of Mexico the population fell from 20 million in 1520 to 1.6 million in 1618 (1997: 210). Whatever the numbers, Amerindian populations plummeted by approximately 90 percent over the course of one hundred years (Clark 2000: 104).

[46] The Portuguese started the slave trade in 1531, and before it ended over 10 million people were forcibly moved to the Americas (Clark, 2000: 49). When the slave trade peaked in the 1780s about 80,000 people per year were being brought to the Americas. Most went to Central and Southern America, and about 5 percent went to North America (McNeill 2003: 169).

[47] This situation led to a great irony. Because of the mono-cropping practices of the plantations, and the expansive and destructive nature of cattle herding practices, resulted in the importation of food into the region from Britain and later from the newly formed United States (Braudel 1981: 227). It also meant that Scotland and Ireland became the major source of beef for the Caribbean plantations up until the end of the seventeenth century after which it sold to England, especially after the enclosures in the English countryside (Rifkin 1992: 57).

The North American Frontier

The West Indies became the site for three distinct cattle-raising traditions originating in Africa, Britain, and Spain. Each of these traditions would eventually be reorganized and reconstituted as three distinct practices of cattle-raising used in North America (Jordan 1993: 64-5). The Texas system was a subtropical system that allowed the cattle to fend for themselves on the open range, and it was the system that extended out onto the Great Plains in the 1860s with disastrous effects (1993; chapter 7). This system extended as far north as Alberta and Saskatchewan at the northern tip of the Great Plains. The Anglo-Californian system was based on the Hispanic pastoral traditions coming out of northern Mexico having its origins from Spain. The primary difference between it and the Texan system was the practice of seasonally shifting pasturelands into higher altitudes during hot dry summer, like the Great Basin of the Californian Sierras (1993: 262ff.). Ranches—*ranchos*[48]—were at the heart of this system, and stock was generally "grass-fed the year round, running almost wild on the open ranges" (Cleland 1944). Last is the Anglo-Celtic system. This system spread West form the Colonies into the Mid-West, the Pacific Northwest, and into eastern Canada. This system was a more labour intensive and focused more on the quality of the breed than any of the other systems, and therefore a natural successor over them once the West became an arena for investment in the post-pioneer phase (Jordan 1993: 267ff.). It is this complexity and diversity of practices and traditions that compels Jordan to question the usefulness of Von Thünen's model. Unfortunately, Jordan goes too far the other way, using a multi-sited ethnographic approach that makes no effort to connect these diverse practices to the capitalist mode of accumulation as a cause of the ecological damage he so often recounts.[49]

New Spain

The first cattle to enter what we know today as the United States came through the Hispanic system. Inspired by dreams of empire, Coronado led an expedition (1539-1542) that entered New Mexico with some "fifteen hundred horses and pack animals" (Weber 1992: 46).[50] There they encountered the Hopi Indians, who within a few years of contact forced the unwelcome Spaniards back into Mexico (1992: 46-9).[51] However, some cattle for whatever reason remained behind and by 1582 there were over one hundred thousand head in and around San Juan New Mexico (Slatta 1990: 21). Permanent European settlement in the region, however, did not take place until the Spaniard Juan de Oñate claimed present-day New Mexico for Spain in April 1598 hoping to expand Mexico's mining frontiers.[52] Through his efforts to incorporate new regions for Spain, settlements were established as far north as Santa Fe as early as 1608 (Weber 1992: 78; White 1991: 11). But, it was not just a matter of showing up. There were very practical reasons for his early success in New Mexico. First, the establishment of settlements (really the taking over of existing native communities) had the political blessing of the missionary Fathers who saw it as an opportunity to proselytise native peoples. Second, and just as important, cattle were able to thrive in such dry and arid climate because of the irrigation techniques the Pueblo Indians were using to farm their own crops (Jordan 1993: 146).

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[48] Its Spanish etymology denotes all manner of housing arrangements. Under Mexican influence it came to refer to any cattle-raising operation where the dwelling space was co-located with the stock (Starrs 1998: 15).

The search for silver and gold by mercantilists soon waned, and more permanent settlements became the centres for cattle-raising. After the 1630s the spread of domestic cattle followed the Christian missionaries backed by the military (Hall 1989: 89). Both cattle and the missionaries began to fan-out throughout the Southwest determined to *civilise* the native peoples by teaching them the basics of farming and livestock-raising (McNeill 1991: 600; Weber 1992: 106). By 1687 the missionaries had moved into present day Arizona and much of what were once the Northern Territories of Mexico east of the Sierras. They had not moved into California yet, but a number of small communities had been established in east and south Texas in the 1690s by Captain Alonso de Leon who was blazing a trail for missionaries (Carlson 2001b: 85-6; Slatta

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49 Jordan tends to take an historically specific ethnographic approach to cattle-raising tradition writing, "Each cattle frontier was unique and far more accidental than predictable, the result of chance juxtapositions of peoples and places. The multiplicity of ranching frontiers in North America is best understood in these ideographic terms" (1993: 308).

50 Richard Slatta in *Cowboys of the Americas* claims that 500 head of cattle made the trek with Coronado (1990: 20)

51 European diseases continued to take their toll; many of the towns the Spaniards came into contact with were abandoned because of epidemics. Smallpox and measles being the biggest killers (Diamond 1997: 211-2).

52 The hope of the Spanish was to continue to find in Nuevo Mexico more land, mining, and more Indians as a labour source for the accumulation of wealth (Hall 1989: 81).

1990: 21). This movement intensified over the next two decades as the Spanish aggressively expanded settlements throughout Texas and New Mexico to protect Spanish interests from the French, who were pushing into the American interior via the Mississippi river system in Louisiana (White 1991: 26-28).[53] By 1715, feral cattle and horses had spread across the southern Texas frontier even before settlers had arrived to set-up permanent settlements (Weber 1992: 309); eighty years after being introduced, domestic cattle numbered some 40,000 head at the Spanish outpost of Goliad, while feral cattle numbered in the tens of thousands, and was the only settled Spanish outpost within trading area of French Louisiana (Carlson 2001b: 85-6).

Spanish missionaries also managed to introduce cattle into Florida at Tallahassee and St. Augustine in 1565 (some fifteen to twenty thousand head by century's end) (Crosby 1986: 177; Slatta 1990: 10). However, they were driven out of Tallahassee between 1702 and 1706 by raiding natives and were forced to withdraw to St. Augustine, which remained a major livestock centre and protectorate of Spanish fleets until the British took over in 1763 (Jordan 1993: 66, 106-7). At which time, the English and natives drove most of the cattle into the Carolinas (Weber 1992: 310).

Historian David Weber claims that the spread of cattle throughout New Spain probably does not constitute full integration of settlements into the capitalist system, at least until after Mexican independence in 1821 (Hall 1989: 246-7). At best the northern territories (the American Southwest) at the end of the seventeenth century would have resembled a more feudalistic society. This claim is not easy to assess. Clearly, cattle were part of a *commodity frontier* throughout New Spain at the local and regional levels, especially in the trade of by-product, and in some areas, like the Caribbean, cattle were from the beginning an integral part of a trans-Atlantic commodity chain. There was a steady trade in tallow and hides between Spanish merchants and the plantations. In the northern region of Mexico stock-raisers were somewhat less connected, while the areas north reaching into the future Mexican territories was still weakly incorporated into the capitalist world-economy. Beef, as fresh meat, would have been a semi-commodified product. Settlers simply slaughtered animals, domestic or feral, for their own use, while the missionary run settlements would have traded in beef by-products while consuming the meat themselves. Though weakly incorporated this region would still be part of the capitalist world-economy because the Spanish were integrating this region as sites of extraction and production as means to maintain their position in the interstate system. With respect to cattle-in the New World, it has long been acknowledged that the success of Spanish settlements (however strongly incorporated) depended on the success their stock-raising efforts (Weber 1992: 310). New Spain would continue these practices until the United States began the struggle to annex the Mexican territories in the nineteenth century. Meanwhile, the Europeanization of the hemisphere continued unabated in great part due to the presence of cattle.

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[53] The French were a major threat to Spanish hegemony in the New World in the first half of the eighteenth century, while the English still remained mostly uninterested, though neither respected Spanish claims to sovereignty in the New World (Weber 1992: 68), so there was a general fear of French and British expansionism, which peaked during the voyages of Sir Francis Drake in 1578-1579 along the western coast of California (Hall 1989: 80).

The American Colonies

Except for Spain, the rest of Europe in the sixteenth century, and in particular Britain, seemed uninterested or unable to exploit the Americas, perhaps because of their greater interest in India. However, once they began their settlements in the late sixteenth century, the role of the Colonies would become increasingly important as a source of economic growth and expansion. For the British, the Colonies represented a straightforward extractive economy that was simply an extension of the British political economy, and subject to the controls of the British government and mercantile interests. It was a zone of incorporation, and despite Spain's early start in the livestock industry in other parts of the Americas, it would be the British breeds and cattle-raising practices reproduced in the colonies that would come to dominate today's beef industry (Williams and Stout 1964: 4).

Typically, cattle-raising by Anglos in the colonies was seen a just another business with low costs (Slatta 1990: 7). The spread of livestock in the Colonies, just like that in New Spain, would not have occurred as quickly as it did if it were not for the commercial pressures coming from an urbanising Europe (Clark 2000: 183). Underlying those pressures was the ideology of private property. The commercialisation of land stirred in cattle-raisers new to the colonies the possibility of securing land and wealth for themselves; much like the gentry had been doing in England. Owning property meant keeping cattle in close proximity to their owners in restricted fenced-in spaces where grazers had limited access to forage. The only possible result was the continuation of ecological degradation that had been occurring in Europe for decades. To stay ahead of this deterioration cattle-raisers began using lime and nitre (potassium nitrate) as fertilisers to maintain the fertility of the land. Grazers, therefore, altered the ecology making them key in the development of commercial agriculture (2000: 175-6). The desire for beef in the Colonies mirrored the tastes of their European cousins as did their cattle-raising practices and land distribution practices. Land consolidation into private hands only deepened the inequality between capital and labour.

In Britain the privatization of land resulted in the formation of new class divisions. There were the prospering gentry, who were pushing hard for the "full commercialisation of [the] economic life," and an increasingly poor semi-proletariat of "seasonal wage workers" engaged in agricultural production (Wallerstein 1974: 256). This commodification of the land and labour resulted in the dislocation and disruption of many of Britain's agricultural workers.[54] Many sought relief by emigrating to the Americas, and between 1621 and 1640 twenty thousand made the voyage to the New England colonies (Flannery 2001:274). English emigration continued throughout the rest of the century and averaged between twenty and twenty-five thousand emigrants per year from 1630 to the 1690s. This migration only began to slow-down after the number of English workers in England had declined enough so that work became available again and wages increased (Kulikoff 1992: 190). Along with the desire of emigrants to escape the harsh social, religious, and/or economic inequalities effecting life in Europe, the same mode of accumulation that was developing there was also successfully transplanted to the New World. Cattle were becoming, as was agriculture in general, commodities traded for profit. Cattle-raising ceased to be about producing food for the material needs of communities. As an emerging commodity, cattle would be raised and processed to meet the needs of the marketplace. Financial viability and profitability were prioritized at the expense of the concrete needs of Britain's poor and the land. Access to the commons was denied and redistributed to those who could afford it. These processes of commodification and proletarianization were resulting in the institutionalization of capitalist ideology and practices. For the cattle producers, the utilization of land and the employment of labour were beginning to be viewed in terms productivity, while continuing to ignore the carrying capacity of the land.

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[54] Ellen Wood argues that capitalism disrupts the more or less natural relations between humanity and nature through the commodification of the 'necessities' of life as a means to expanding markets and maximizing profits by breaking the relationship between the product and the producer. Capitalism appropriates the land and secures for itself, at the expense of the producer, the only access to the means of production (2000: 23-5). For her

Cattle can have many beneficial impacts on grasslands. They stimulate grass growth, the spreading seeds, and their manure revitalizes the soil. Even within a domestic environment, that is, when stock animals are corralled or penned, the cattle and the land can exist in a "symbiotic relationship" so long as the relationship is managed properly. Unfortunately, this relationship has been disrupted by cattle-raising practices such as mono-grazing—practices directly related to commercial interests. Once cattle-raising becomes a "business" there were strong commercial reasons to overstock and overgraze the land beyond its carrying capacity (Jordan 1993: 10). Over time, people begin to see the ecological damage as a normal outcome of stock-raising. This is a form of fetishism that reifies nature and is derived from a particular ideology. When this is overlooked or forgotten, capitalism becomes a part of the socialization process (Braudel 1977: 45). That in turn informs how the environment is valued. Consequently, settlers, when given an opportunity to prosper in a way that was not possible in their European homeland, neglected environmental issues in favour of maintaining their livelihoods.

Environmental Impact of cattle in the Colonies

Though cattle would later flourish in the temperate climes of North America to an even greater degree than they did in the tropics of Central America, the initial attempts to introduce cattle were unsuccessful (Crosby 1994: 54-5). The British first tried to settle in the New England states at Roanoke in 1587 and again later at Jamestown in 1607. In both cases the settlers and the animals died. One reason is that the local forage could not sustain livestock over the long, cold north-eastern winter (Davis *et al* 1972: 18). The other is that European crops like wheat, oats, barely, and rye did not do well—the soil in

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capitalism was born in this agricultural transformation, where the act of dispossessing the people of their land—the usurpation of traditional property the northern colonies was much shallower and sandier than Europe's, and unlike corn, the native crop, these grains required repeated ploughing and harrowing that was not a suitable practice in New England (Crosby 1994: 170). Regardless, replacement cattle were brought in from England in 1611, and again died (Williams and Stout 1964: 4). Eventually, Captain Edward Winslow brought the Plymouth Colony in Massachusetts its first three heifers and a bull in 1624 that were able to survive, with more arriving in 1625 (Field and Taylor 2003: 644; Williams and Stout 1964: 4). During those very early days of the colonies, cattle were not valued for their meat. They were primarily used for their dairy and as work animals, and they were rarely slaughtered for food (1964: 5).

It was a slow transition; nevertheless, unbeknownst to the settlers at the time, the process of incorporation and transformation of the environment was well underway. Those cattle leaving Europe were carrying large numbers of 'weeds' waiting dormant in the guts of the animals. The most "imperialistic" of these were Kentucky bluegrass and white clover that once seeded went-out ahead of European settlers (Crosby 1994: 38). Even the bumblebee was an import from the Old World and was important dimension in the spread of one of cattle's favourite feed plants—red clover (1994: 40-1).[55] It was not until the 1660s before European grasses were deliberately transported to the Americas, after which cattle really began to take hold and thrive (Davis *et al* 1972: 18).[56][57] Even so, it was still necessary for those living in the New England region to dedicate some parcels of land to grow forage to meet the needs of local cattle-raisers (Whitney 1994: 252). A situation that was at least partially responsible for the Colonies remaining a net importer of food from 1640 to the end of the century (Steinberg 2002: 26), and regardless of the demand for wood for ship-building—New England's main export after the 1640s (2002: 35)—it was agriculture that caused most of the deforestation (Clark 2000: 180). The destruction of the environment was quick, and by 1629 most of the forests in the New England states were cut-down and turned into pasturage and cropland. Native fauna was

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rights—otherwise capitalism could not have emerged (Clark 2000: 38-40).

[55] Weeds do not take over because of some biological advantage, but rather because of the instability of created in the local environment, usually caused by the highly disruptive presence of grazers (Crosby 1986: 170).

[56] Crosby dates this differently at 1675 (2000: 157).

[57] The other environmental cost had to do with local predators; the early colonists killed many of them while protecting their livestock, further disrupting the local ecology. Many were brought to near extinction (Steinberg 2002: 34).

also under noticeable pressure from European 'weeds' in all areas east of the Mississippi (Crosby 1986: 157). But even as Old World forage was taking hold, the colonists were putting more pressure on the ecology than was necessary by not following the known practices of crop rotation. In Europe, where land was already reaching its productive limits, crop rotations and manuring were still closely followed, whereas the in the colonies once the soil was exhausted more land was cleared (Steinberg 2002: 41).

Meatpacking: in the beginning

William Pynchon is regarded as the first commercial meatpacker in the United States starting in 1662.[58] It came in response to two trends: urbanisation and population growth.[59] Both were making it increasingly difficult for townsfolk to raise and slaughter their own cattle, as was the standard practice among colonists of the time. The need for a centralized service soon spread to New York, Philadelphia, Charleston, and Norfolk. These were becoming core centres, while the southern colonies, like the Carolinas, were becoming regional, peripheral areas as they moved their cattle north for slaughter and processing, and as early as 1676 cattle were sold at auctions and driven from the Carolinas for slaughter in the northern states of the colonies. Some of the meat was packed in barrels for export to Caribbean plantations. The other factor in the growth of centralized meatpacking plants was the French Revolutionary wars, the Indian wars, and American War of Independence during the eighteenth century (Williams and Stout 1964: 6-7). Out of necessity, all trading communities eventually develop hierarchies of trade to deal with changing individual situations and increased trading distances change social organisations to handle the new circumstance (Braudel 1982: 376). By the 1690s, the trade in barrel-packed beef, tallow, hides, and other by-products was quite substantive. Beef and beef by-products were being traded within the New England states and down into the West Indies (Jordan 1993: 119-120; Clark 2000: 175-6). The development of a meatpacking industry was enhanced by two other factors in the seventeenth century beef industry. First, beef was the favourite meat among colonists,[60] and second, settlers used meatpackers as a source of immediate cash in the marketplace.

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[58] Field and Taylor date this differently at 1636 in Springfield Massachusetts where beef and pork were packed in barrels and began an export trade to the West Indies in the 1650s (2003: 645).

[59] By 1700 the non-native population in the Colonies was about 230,000. After that, it would increase at a rate of 35 percent per decade. By the time of the American War of Independence the population was 2.75 million, and more than 5.3 million by 1800 (Williams and Stout 1964: 7). Britain began developing settler colonies in North America and at the beginning of the eighteenth century most of the permanent settlements were English (Wallerstein, 1980: 101). This would change after 1700 as the English economy recovered (Kulikoff 1992: 190).

Summary

The most important issue during this period from 1494 to 1713 was the ongoing agricultural crises throughout Europe, especially in north-western Europe in places like Britain, France, and Spain. There was a need to find new solutions to the problem of too little pasturage for beef. Land for cattle was a major factor among several that led Britain and Spain to seek colonial expansion (Rifkin 1992: 32). That need clearly demonstrates the veracity of *systemic cycles of agro-ecological transformation* as an important mechanism for social change, and therefore the reproduction of social life in the core. Perhaps more interesting is the clear evidence for Clark's hypothesis that life globalizes simultaneously; therefore, European expansion was uniquely dependent on the adaptability of European biota in the New World, giving Europeans the opportunity to expand their territorial boundaries and begin the process of incorporation. Cattle not only flourished in the Americas, they transformed the ecological landscape, which allowed Europeans to "mimic" their European socio-political lifestyles. Crosby makes a similar argument.

The fortuitous discovery of the Americas would lessen the pressure on Europe's states to change from implementing a capitalist mode of accumulation. The Americas were transitioning from an external arena to the periphery of an expanding capitalist world-economy. One of the major impacts of cattle in North America was that it suddenly provided a large source of food (Crosby 1994: 19). Anglo-American labour in the periphery was being drawn into a process of producing commodities for the core. From the beginning of the modern period people were being exposed to increasing levels of long distance trade as it became cheaper to import bulk commodities than to produce them at home. Many people were enjoying access to these commodities, while mostly unaware of the underlying transformation taking place because of these practices. For the first time in history the majority of people were being 'delinked' from the seasonal cycles of agriculture and subjected to the fluctuations of markets (McNeill 1991: 584-5). Initially the commodification of beef was slow because of the lack of technology, especially in the areas of communication and transportation. Consequently, by-products, like hides and tallow, were the only bulk commodities that could be transported over long distances.

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[60] By 1700 the typical colonist diet would have included orchard fruits like apples, cherries, peaches, pears, plums and quinces. They enjoyed quick breads, including tarts, pies, biscuits, shortbread. They also ate peas, beans, and lentils, which were the bulk of their diet, although their favourite meats were beef, pork, and chickens, which they favoured over local game or fish. White flour would not be available until after the 1830s, but sugar was always available because of their proximity to and trade with the West Indies; first in the form of molasses, and then later as white processed sugar. Rum was the alcoholic drink of choice along with tea, coffee, and chocolate (*Davis et al* 1972: 74-6). Many of these foods, like oats, wheat, peas, turnips, peaches, cherries, and flax, originated in Europe (Crosby 1994: 66).

CHAPTER 3 THE UNITED STATES: AN "EMPIRE OF LIBERTY"

> Capitalism is a logic at work through a mode of production: a blind, obstinate logic of accumulation.
>
> Michel Beaud (1983: 115).

This period from 1713 to 1842 was bounded by the Treaty of Utrecht on the one hand and the Great Migration west across the continental United States beginning in 1842 on the other. It was an era in which changes to the American political economy set the tone for westward expansion in the nineteenth century (Starrs 1998: xvii). Ultimately, that transformation would culminate in the sacrosanct cultural myth of the cowboy and cattle ranching in the late nineteenth century, especially as it was described in the work of historian Frederick J. Turner in his report to the American Historical Association on *The Significance of the Frontier in American History* (1893). The Turner Thesis, as it became known, claims that the greatness of the United States—economic or otherwise—is found in the moral characteristics of its citizens who, quite a part from their European cousins, have a relationship to the land that is unique to them based on the virtues of the agricultural life; from which the notions of liberty, democracy and individualism sprung (Breisach 1994: 314; Gilderhus 2000: 112-3). According to this thesis the expansion of the United States occurred not for economic reasons, but to meet the needs of an industrious people's passion to exploit the soil and the land for their material benefit (Turner 1893). Turner called the expansion of cattle into the western territories as "the greatest pastoral movement in recorded history" (Turner qtd. in Rifkin 1992: 68) as if to say, this was a peaceful and tranquil agrarian movement that rose out of the need of European migrants to challenge themselves. Turner's report has long been controversial because of its' view of American life and expansion. Jeremy Rifkin, on the other hand, is emphatic. The opening of the American West was undertaken for the expansion of beef markets to feed Europe—period. The rest is myth (1992: 108-9). The historical evidence favours the view that cattle-raising practices swept across North America because of a conjuncture between favourable environmental conditions and market conditions.

Peculiar to this period are three main events that are historically relevant to the deepening of the ecological contradiction between cattle-raising and ecological degradation. First, the United States emerged as a political entity taking a place within the periphery of the global interstate system. As such, the incorporation of the United States represented a major triumph for the fortunes of an expanding and evolving capitalist world-economy. Second, the United States' relationship with the land was increasingly mediated, as it was in Europe, by a capitalist mode of accumulation. Thomas Jefferson restructured these relations by redistributing the wealth across a broader range of individuals—to the yeoman farmer.[61] In doing so, he imposed a distributive system that did not respect the capacities or the limits of the land to adapt. The system continued the process of exhausting the land through overstocking and overgrazing and deforestation. Subsequently, geographical expansion became a political, economic, and ecological imperative consistent with Foster's observation that any break in the nutrient cycle will result in the expansion within the system. The cattle industry today still lives with the consequences of Jefferson's grid, affecting how the American West is used and organised through private and public ownership of the land. Third, cattle, after a millennium of domestication, were about to be husbanded in radically different ways in an effort to overcome the increasing environmental problems involved in supplying beef to the market in the face of a growing population. However, a closer look reveals that the attempts to solve the issue of supply and ecological degradation were organised around the ideology of private property, which was established to ensure the concentration of wealth and power in the hands of the upper classes in Europe.

America and the Interstate System

Given the problems of storage and transportation, the trade in beef was fairly significant at the global level of the world-economy. By-products, like hides and tallow, were easily traded, though some beef was packed in barrels in the United States and sent to the West Indies to supply the sugar plantations. By the time of American

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[61] Yeoman means that farmers owned their own means of production, and they were a class unto themselves (Kulikoff 1992: 34).

Independence in 1776 this trade was well established (Moore 2000b: 427).[62] The importance of the Treaty of Utrecht as a demarcation point is that it represents the beginning of drastic social changes in the colonies in relation to the existing capitalist world-economy. After the signing of the Treaty, there were not significant changes in the trading patterns between North America, Europe and the West Indies, but a quickening and deepening of capitalists economic relationships to keep up with the local and regional demands of a rapidly growing population. It was an era of economic growth coming almost entirely from the simple geographical expansion of European interests (Davis *et al* 1972: 372).[63] Though the Treaty of Utrecht falls in the middle of this time period—1689 to 1763—it was characterized by English and French rivalry that effectively ended French influence in the American colonies (Wallerstein 1980: 245; White 1991: 31), and their eventual withdrawal in 1803 after the sale of Louisiana to the United States. It was an important historical moment for another reason. It ushered in a long period of peace that would last until 1755, after which began the final round of rivalry resulting in Seven Years War (Davis *et al* 1972: 19). That breathing space allowed the North American Colonies from Maine to Charleston in the Carolinas to grow their economies substantially, most notably in the agricultural sector that engaged 85 to 90 percent of the population. The Colonies were essentially self-sufficient in most of the basic foods, with the exception of the New England states that imported some foods from some of the other states (1972: 19-22).[64] However, this really only affected urban population, since most members of households lived on farms and supplied their own needs in housing and food (1972: 61ff.). Of these, meat eating was arguably the least commodified food source at

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62 The trade in beef between South America and Europe was much more significant at the time than it was between North American and Europe. Cattle were having an enormous impact in South America; by 1709 approximately 12 million acres of forest had been cleared in South America to make room for more pasturage to increase production (Chew 2001: 126). Most of the meat was sun-dried and used to feed Europe's poor and slaves throughout the region, who were an integral part of the world-economy.

63 In general terms, during centuries from 1500 to 1800 the world was becoming increasingly unified through trade, and increasingly the lives of people in one region were affected by events occurring in distant regions, and vice versa. At the level of the environment it was a "partial homogenization" as plants, animals and diseases were transported around the world (McNeill, 2003: 178-9).

64 The biggest economic problem facing the colonies was the lack of capital investment and the lack of labour in relation to resources (Davis *et al* 1972: 566).

the time. Cattle were for the most part raised and slaughtered by individual households for their own immediate use.[65]

In hindsight, the Treaty of Utrecht also represents the beginning of the English hegemonic expansion (Arrighi 1994: 206). The eighteenth century imperialism of Britain, France and Spain in the Western Hemisphere continued to dominate and exploit the 'natural capital' of the colonies. The transportation of that wealth fell to government-approved merchants, who were given a monopoly over this trade (White 1991: 27). Trade policies, particularly those of the British, were manipulative and employed to ensure an inequitable division of labour between itself and the periphery. Policies limited North American exports to cheap resources, and actively discouraged trade in manufactured goods for the sole purpose of ensuring the competitiveness of British manufacturers (Davis *et al* 1972: 567). One of those trade mechanisms were the Navigation Acts of 1651 and 1660 (Arrighi 1994: 204; Wallerstein 1980: 102).[66] Britain, an ascendant power, tried to organise its access to raw materials in a way that ensured only cheap resources were available to its' urbanised working poor (Bunker and Ciccantell 1999: 108). The colonists were becoming discouraged by how deeply integrated their economy was within the capitalist world-economy, and that neither geographical distance nor political independence gives individual nation states autonomy within or even from the world-system (Braudel 1977: 82-85; Wallerstein 1989: 196-202).[67] When the peace finally ended in 1755, the British subjected the colonies to coercive trade practices in an effort to pay for their war with the French. Eventually, these restrictions led directly to the colonial rebellion and the war for independence starting in 1776 (Arrighi 1994: 60; Wallerstein 1989: 202-3). But even after independence, British involvement in the young American economy continued to grow and would not peak until the 1830s (Hall 1989: 174).

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[65] Tables on pages 76 and 84 of Lance Davis *et al* book *American Economic Growth* show that even in the 1830s purchases for meat and eggs were virtually non-existent for those living on the farm (about 85 percent plus of the population), while city dwellers paid less than 10 percent of their yearly household budget on these products (Davis *et al* 1972); even though meat was a popular food item among colonists, even when we take into account the fact that beef for practical reasons was not eaten as much as pork or poultry—though Whitney (1994) claims otherwise—it is not unreasonable to draw from this data the conclusion that meat in general was still widely available on the farm and that it was not yet a fully commodified product.

[66] The Navigation Acts gave control of Trans-Atlantic trade to British fleets. All goods were supposed to be shipped via the British; natural resource materials were encouraged, especially food stuffs, while manufactured goods were discouraged by charging tariffs in an effort bolster the competitiveness of its own manufactured products at home (Davis *et al* 1972: 550). This is a clear example of how capitalism cannot operate without the intervention and support of the state; they are Amin claims "inseparable" (1997: 15). This support is essential in that capitalists are unable to create markets for themselves because clearly no rational worker would support a system that exploits them, so state governments have to intervene, legislate, and enforce capitalism on people on the capitalist's behalf (Shutt 1996: 63ff.).

[67] Even after Independence, over 90 percent of American imports still came from Britain and American revenues came mostly from tariffs on these imports (Wallerstein 1989: fn. 226: 229).

The main problem for the American economy from 1789 to 1839 was that it was still essentially a "peasant economy" engaged almost exclusively in agriculture. Only about three percent of the population was engaged in manufacturing finished products, and with most of that development occurring in the last decades of this period between 1810 and 1840 (Davis *et al* 1972: 190). Trade in these items was less than 1 percent of American exports in the 1770s, and only increased to six percent of exports by 1840.. Still, the economy of the Colonies/US grew at a very respectable annual rate of 3.1 percent (in absolute terms) from 1710 to 1840 (1972: 22). Most of the trade was in processed goods made directly from America's abundant resources. Cattle figured prominently in this trade, mainly supplying beef tallow for candles (1972: 568). Growth in American exports after 1790 grew significantly over the next seventy years; but mostly in relation to its growing population, putting more pressure on the land to produce for local needs. For the most part, economic growth was not due to growth in more profitable sectors like manufacturing. For Britain and the rest of Europe, however, trade was sufficient for them to continue the processes of industrialisation, urbanisation, and the specialization of labour in Europe. Trade between the two regions was becoming more dependent upon one another for the preservation of their respective economies. At this point, the Americas were now part of the periphery of the capitalist world-economy (Braudel 1982: 176). In that position, America became the agricultural supplier to Europe, in which the export of cheap meat would play a considerable role in that trade (Davis *et al* 1972: 549, 558), with the manufacturers located in the core of Europe.[68]

Jefferson's 'Grid'

After the signing of the Treaty of Paris in 1763, and again in 1772, America suffered a series of post war economic depressions that affected all sectors and levels of American society. As a result, America's urban centres experienced a rapid growth in inequality, especially in Boston (Wallerstein 1989: 198-200). Socialised in this environment, Thomas Jefferson began to formulate his own version of America as an "empire of liberty" (White 1991: 63). He advocated the institutionalization of a new and emerging class of yeoman farmers (Kulikoff 1992: 43) as a countervailing force to the powers of the traditional aristocracy for the maintenance of social and economic order. After the War of Independence, Jefferson was fearful of two contradictory forces. On one hand he feared the rebellious nature of America's frontier farmers, who were the backbone in the fight against the British for independence. He feared that if they did not benefit from the overthrow of the British, they might rebel against their own government. On the other hand, it was the enterprise of these same individual farmers that buoyed and formed the basis of the young American economy, so he feared excluding this "growth sector" from an active role in the future of the Republic and economy (Slotkin 1994: 69). He was motivated; it seems, by the need to ensure the nation's economic well being without duplicating the same class divisions of Europe in every sector of the economy. Jefferson believed that America's future prosperity was clearly dependent on America remaining an accessible agricultural state (1994: 68-76).

Further, Jefferson believed that farmers were the means to avoiding the concentration of wealth in American society. He idealized the family farm as the basic economic unit. Jefferson's plan to restructure the class struggle in America differently from the class struggle existing in Europe and in America's cities was also the basis for a growing national mythology of the family farmer as a morally superior citizen (Hill 2003), which would culminate in idealization of the American character expressed in Turner's Thesis. For Slotkin this cultural myth becomes a signifier for the deeper structured processes of the capitalist economic relationships now impacting all social relations throughout the United States (Slotkin 1994: 70). Though Jefferson was dubious of ascribed statuses he believed they were necessary to maintain social control over people who were impoverished by capitalist economic relationships; class and racial distinctions in industrial urbanised centres were an inevitable outcome of capitalist logic (Hopkins and Wallerstein 1982; Slotkin 1994: 68-76; Wallerstein 1991: *passim*, 2001: 83ff.). The yeoman farmer would stand in opposition to the despotism of the cities as a class of free

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68 Trade in meat would improve in the nineteenth century. Given royal accent in 1814, Britain began importing tinned beef from the peripheral areas of

individuals who would check the tendency of aristocracy to deny access to wealth to the poor (Slotkin 1994: 68-76). In selling vast amounts of public land to individual farmers the government could sustain the prosperity and well being of themselves and the nation because the farmers would own their own means of production and extract their own surpluses from what they produced (Kulikoff 1992: 22). The strategy was to secure the "independence and virtue" of the people and the nation by incorporating more land (White 1991: 63). The survivability of these sets of social relations would depend solely on the capacity of the American farmer to push out from the eastern states and move the frontier further west.

As a practical matter the notion of the yeoman class developed over the course of the eighteenth century in response the class conflicts that still existed in the colonies, warfare with America's indigenous peoples, and conflict over how and who should rule in the colonies (Kulikoff 1992: 37). These conflicts had their roots in British society. Many farmers and stock-raisers lost access to the historic commons and rents were imposed. Some were able to sell their small plots to larger landowners, while others who could not afford the rent had to move off the land and find livelihoods elsewhere. Many commoners, who were no longer needed to work the land as labourers for the gentry, were forced by a law introduced in 1775 to work in the salt and coalmines. The impact of the enclosures in Britain uprooted commoners and "freed" them for wage labour (Beaud 1983). Observing this crisis of the masses, Jefferson understood that the treatment of 'the people' was important to the nation's survival. He seemed intuitively aware that the "distribution of property determines the distribution of income" (Amin 1998: 36). That is why Jefferson tried to even the playing field and distribute wealth more evenly throughout male, white Anglo-American society. To that end, the US congress enacted a Bill in 1785 presented by Jefferson to make law 'Jefferson's Grid' (based on the US rectangular Land Survey of 1775). Under this plan, plots of land would be auctioned-off in rectangular parcels of 160 acres. He believed this would prevent the creation of agricultural monopolies, while also stopping the wealthier classes from

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Australia, South America, and the United States (Clark 2000: 196).

pauperising the agricultural sector (Steinberg 2002: 59-61).[69] As a new social class, he thought that as long as farmers remained debt-free they would continue to prosper. His goal was political and economic independence for the country and the farmer (Kulikoff 1992: 22).

The Rise of the Yeoman Farmer and the Cattle-raiser

The predominately English migrations of the seventeenth century to the colonies was replaced after 1710 by mostly Scottish, Irish, and German migrants—45,000 per year in the decades of 1710 and 1720; 33, 000 per year in the 30s and 40s; 61,000 in the 50s and 60s; and, 74,000 per year from 1770 to 1775 (1992: 190). These were remarkable numbers for the time. By the 1720s, population pressures within the colonies were already outstripping the supply of land. These pressures would eventually lead to the westward migrations in the early decades of the nineteenth century (Steinberg, 2002: 50). Until then, farm sizes within the states were decreased to allow for more private ownership. The situation was made worse because of the poor mentality settlers had toward the land. Many colonists were unable or unwilling to find the proper balance between grazing and crop growing, which resulted in widespread soil exhaustion. The solution was to incorporate more meadowland to sustain current agricultural practices (2002: 43-7). Another aspect of these difficulties was the social pressure arising from a system of privately owned land. Growing inequality in urban centres and a growing population were having a negative impact on the ability of settlers to access arable land for cultivation. By the 1750s, before the implementation of Jefferson's gird, wealthy individuals were buying land and then renting it to those who could not afford it or find it for sale within the colonies (Kulikoff 1992: 40). Jefferson's grid was meant to stop this practice and ensure the availability of farmland for any settler who could afford it. There was also another problem; even if the land owning monopolies could be broken there was still insufficient land to settle. That meant looking for land in Appalachia and then beyond the Mississippi River. Early in American history, owning land became a means of escaping a life of wage-labour. What unfortunately emerged after the War of

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[69] This is the main contradiction of state-capitalism that McNally points to as well: "capitalism cannot produce a genuine social rationality; there is an

Independence was an ideology of "possessive individualism" where an individual's property rights became paramount, becoming a force separating people from social communities of co-operation (1992: 43).[70]

Eventually, the ideal of the yeoman farmer failed, though the practice of selling-off small parcels of land continued well into the twentieth century. Until 1820 the parcelling and selling of lands was done at the state level; however, after 1820, in response capitalist investors wanting more access for development and farmers wanting free land, the US government through Congress tried to regulate the price of land and sold it at public auctions open to all. The result was financially-backed speculators bought-up most of the land, while most settlers had to in turn buy the land on credit from those same speculators. The impact for individual farmers was that they were forced to produce for the market in order to pay off their debts (1992: 44). The introduction of the Homestead Act in 1862 did little to alleviate the problem; in ranching circles those without money ended-up in permanent roles as wage labours (1992: 53). These cowboys as they became known were later mythologized and used to symbolize virtuous individualism (Slatta 1990: chapter 12).

Even though the cattle industry in terms of importance was one of the main agricultural efforts during the colonial times, cattle-raising would not later figure into Jefferson's ideology of the yeomen farmer (Whitney 1994: 164). For practical reasons people were dependent upon their livestock. Access to salted beef and pork was critical to the survival of households because it was often the only food available toward the end of a long winter, during infertile or hard times. Cattle were an important asset, and were

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inherent gap between what seems rational for a part of the system and what is in fact rational for society as a whole" (McNally 2002: 87).

[70] Jefferson was unconcerned with the plight of the America's native population, calling them 'half-breeds' and not worthy of consideration (Slotkin 1994: 68-76). The 'problem' with the natives and the ensuing conflict between them and Anglo-Americans was not resistance to the reservation system, but to a growing capitalist state that had a more utilitarian and efficient approach to land-use; Indian nomadic lifestyles simply could not compete against that kind of incorporation (Hall 1989: 234). In response to those pressures, from the 1790s to the 1840s , natives opportunistically destroyed ranching efforts, creating uncertainty within the industry from which it would not recover until after the 1840s (Slatta 1990: 23), perhaps due to the massive onslaught of migrants. During the same period and perhaps worse, Michael Beaud writes in *The History of Capitalism* that what truly enabled the emergence of mature capitalism was slavery. Millions of Africans were 'used-up' as unpaid workers, and it was through them that the European Bourgeoisie was able to accumulate the wealth necessary to create capital for investment (1983: 44). Profitability on their surplus-value would have been enormous, and there may be a correlation between the slave trade, which was peaking around the 1780s and the development of financial institutions that had accumulated enough wealth to in turn finance capital ventures. In 1694 the first bank opened in London, by 1776 there were 400, and by 1779 stock market speculation came into existence in Paris, and for the first time money began to be widely circulated (Braudel 1982: 111-2).

often bartered or exchanged for other goods or services (Steinberg 2002: 46-9). However, there was no escaping the reality that cattle need vast amounts of space for grazing. Spaces cattle-raisers could little afford without harming their bottom-line. Furthermore, breaking the countryside into small rectangular parcels, which may or may not have access to riparian areas for watering animals, was also of little value to the rancher. Under these conditions, ranching as a capital venture was not possible, mainly because cattle-raisers depended upon access to common lands and riparian areas to graze their cattle year round. Still today, this contradiction plays out in arguments over private and public lands in America (Starrs 1998: 43-4). Even when conditions are good, cattle can quickly degrade the land if it is overstocked, requiring cattle-raisers to seek more land or reduce the number of cattle and since reduced numbers mean lower levels of productivity it was an unlikely economic choice. There was also a lack of co-ordinated effort to practice the rotational system between farmers and cattle-raisers, using the techniques of manuring, resulting in further deforestation and soil exhaustion. The alternative was to incorporate more pasturage (Steinberg 2002: 50; Whitney 1994: 233-5). Another reason for the movement of cattle came from farmers trying to escape worn-out pastures (Crosby 1986: 179). Jefferson's gird system only intensified this situation by imposing an ideological solution to a practical problem. Property rights prevent governments or social organizations from acting in the interests of the common good. This is a prime example of how the link between ideology and land-use—*systemic cycles of agro-ecological transformation*—interact to effect nature. In the meantime, however, these forces push cattle-raising to the fringes of society, consistent with Von Thünen's spatial model.

The lack of transportation also limited the ability of people to incorporate more land (Wallerstein 1974: 349).[71] From the 1730s right through to the 1840s, an agricultural revolution was underway that was characterized by a lack of technological change.[72] The most important advances came in the form of new types of fodder. New legume crops introduced in Europe increased soil fertility and could therefore support larger herds on the same amount of land. Increased carry capacity meant there would be less conflict between cattle-raisers and crop farmer for access to more land, which had become the main dietary staple of the working classes (Wallerstein 1980: 84; 1989: 12).[73] Without technological innovation structural change becomes necessary. For example, within the colonies drovers often brought cattle to market from the Carolinas up to Boston along the east shore, but weight loss over the course of the drive negatively affected the price per head. The meatpacker also had less meat to sell per animal. The difference appears to have been significant enough that meatpackers began to follow the westward movement of the cattle-raisers. The plant at Cincinnati, though mainly used for slaughtering hogs, opened in 1818 along the Mississippi river where it had access to shipping (Williams and Stout 1964).[74] Cattle-raisers and meatpackers would benefit greatly after the 1850s when railways improved the internal transportation problems (Perelman 1977: 131).[75] In the meantime, it was still cheaper to transport goods across the Atlantic than it was thirty miles overland (Wallerstein 1989: fn. 329, 247).

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[71] This is not to say technological innovation drives the expansion of the capitalist world-economy, rather it is a consequence of it. That is, innovation generally occurs as a result of the drive to produce a new profit making product (Wallerstein 1983: 37). William Robbins has the other way around, and concludes that capital investment was made possible by the existence of rail (1994: 72ff.). I disagree. Cattle were already well established on the frontier and desired by the public, so it was a matter finding ways to get the beef to the market.

Cattle-raisers were also under pressure to move out of the southern states where cotton crops were becoming important to the national economy. Until the invention of the Cotton Gin in 1793 the cultivation of cotton was a labour intensive process that was confined to the eastern seaboard. After its invention it made expansion "economically feasible" (Davis *et al* 1972: 242). Not surprisingly, cattle-raising in those areas began to decline and southern cattlemen were pushed west of the Mississippi. Before long cotton was being grown on both sides of the Mississippi (Williams and Stout 1964), supported by the river-based transport system. However, this was not the only reason to move west. Eastern and southern cattle-raising areas were experiencing decline because of

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72 McNeill agrees: dating this period of no technological development in agriculture from about 1500 to 1800 (2003: 201).

73 Wallerstein also notes that legume crops increased the fertility of manure, which was used to revitalize the land (1989: 13n55).

74 The availability of rail transport was low. By 1840 there was only 1900 miles of track, mostly in the eastern states. It was not until 1852 that cattle were first hauled by rail from Kentucky, and even then this was an unusual practice. The main form of mass transport were the steamboats of the Mississippi established in 1818, which is why meatpacking plants opened in Cincinnati, St. Louis, and Louisville (Williams and Stout 1964).

75 Another issue surrounding the commodification of beef is that most cattle in North America were feral, including many animals in the colonies, where they competed with domestic stock for forage (Crosby 1986: 178-9). It is not possible to commodify a resource without the ability to control access to the supply. Still, cattle-ranching was already the number industry west of the Mississippi, and unfortunately for the industry by the 1820s production was well ahead population growth and access to markets, so the industry focused on trade in cow hides, not meat.

overgrazing so ecological exhaustion pushed cattle-raisers into Ohio in the 1820s and Kentucky in the mid-1830s (Slatta 1990: 18; Williams and Stout, 1964).

Husbandry: Robert Bakewell (1725-1795)

Robert Bakewell, a stock-raiser from Dishley in Leicestershire, changed our practices and attitudes towards cattle as an animal. In Britain people were growing tired of poor quality beef. A sympathetic Bakewell began a lifetime of experimentation, inbreeding cattle for the express purpose of providing meat complaining, "you cannot eat bone, therefore, give the public something to eat" (Pawson 1957: 50). Ironically, the enclosures gave him the opportunity to carryout controlled breeding experiments that would improve the quality of the meat for consumption without deference to the ability of the animal to work (Carlson 2001b: 172-4). What Bakewell ended up with were cattle that required less food, but were fattier and also matured quicker. Cattle went from an average of 370 lbs. to an average 800 lbs. in 1780 because of the work of Bakewell (2001b: 177-8). The impact was immediate. The British public became obsessed with fattier meat, while stockbreeding among the English Gentry became an obsession. By 1800 a bull named Durham Ox weighing nearly 3000 pounds was paraded around the British countryside where people paid just to look at the animal. Cattle became symbolic of British power and it was this obsession with good quality marbled beef that led to the virtual annexation of American pasturage by British financiers (Rifkin 1992: 60-4). By the twentieth century this tradition has resulted in a variety of unnatural practices in an effort to adapt animals to meet consumer tastes.

Going west: the promise of prosperity

The idea of 'going west' was not a natural inclination of the Americans, rather an expression of nationalism seeking economic power and security. Americans were intent on becoming a competitive nation with the ability to join the inter-rivalry of the core states as an economic and political powerhouse.76 Cattle-ranching was not as Turner presumed it the natural outcome of American characteristics (Slatta 1990: 19). Arguably the West was already open, just not as far as white European capitalists were concerned. As cowboys and ranchers pushed their way west conquering the land they were encouraged by the insatiable desire of the British for fresh beef backed-up by their deep pockets. The American expansion west was mostly the result of British financial investment (Rifkin, 1992: 52), because despite its independence, the United States continued to be tied to the British economy, mainly because they had the manufacturing capacity and it was through them that Americans hoped to have continued access to European markets (Wallerstein, 1989: 228).

The first official act to explore the west by the United States government was undertaken by two army officers named Lewis and Clark whose expedition ending in 1806 reported to then President Jefferson that the west was a resource rich environment that could easily be exploited. Their expedition reinforced in the national culture racist attitudes toward native peoples. Imaging conquest and riches, settlers from the east made their way west. Cattle-raisers had already established themselves in these areas, so they greatly benefited greatly from this influx of people, providing food to townsfolk otherwise engaged in mining or other economic activities (Robbins 1994: 45ff.). In the Southwest by 1800 trade between New Spain and the United States though minor in terms of dollars and profitability was vital to the region's economy. There were large annual cattle drives into French Louisiana with stock coming from the Mexican held parts of Texas and from Mexico destined for markets in the United States, the West Indies, and Europe (Slatta 1990: 20-22).

The Americans in the eastern states were on the tail end of a period of unprecedented prosperity from 1793 to 1807 coming yet again at the expense of another European war between the French and the English. This prompted the Americans to flex their own national muscles. The result was the territorial War of 1812 started by the Americans as a "last act of decolonisation" (Wallerstein 1989: 251).[77] Yet, there was little enthusiasm

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[76] The prerequisite for the creation of strong states within the interstate system was the rise of nationalism both in the core and in the periphery (Wallerstein 1974: 145).

[77] This is an American view of the war that omits much. In Douglas Francis's book *Origins: Canadian History to Confederation* the causes of the war had little to do with American acts of altruism to help Canada become a free nation. Rather, it was an act of aggression against Tecumseh and his Native Confederacy based on the incorrect suspicion that the British were encouraging raids on Americans living in Ohio, Tennessee, and Kentucky. It was also seen as an "opportunity to seize Upper Canada" from the British in an attempt to impose its national will (1996: 212).

for the war. The Americans wanted to improve their status in the world economy and Britain wanted continued access to American resources without having to compete for them in the marketplace. Both sides eventually signed-off on the war with the Treaty of Ghent in 1814 in which the British, in an effort to maintain monopolies on the Trans-Atlantic trade routes acknowledged the right of the Americans to expand their own territorial interests in the west (1989: 251). Within a decade Florida (1819) was added to the country. The United States now owned all the land east of the Mississippi. Four years later President James Monroe issued his famous edict—the Monroe Doctrine—which threatened to intervene against any European state interfering anywhere in the Americas. It was an aggressive doctrine that from the outset demonstrated America's view of itself as an empire in waiting (Ikeda 2002: 107). As for the desire of some "hawks" in Washington, it would be some time before the public made any significant moves to "conquer" the west. The public, it seems, were less interested in expansion than their material security. Most still considered the move west a major personal and financial risk; consequently, the west remained virtually unpopulated by Anglo-Americans until after the Great Emigration of 1842 (White 1991: 61-72).

Mexico: liberty's victim

From 1765 to 1846, the American-New Spain/Mexican frontier was experiencing great upheaval. New Spain was experiencing internal conflict that would lead to Mexican independence in 1821 and external pressure from Anglo-Americans pushing west (Hall 1989: 134). The decision by the United States government to snatch-up Louisiana in 1803 from the French was directly impacted by Jefferson's belief that more land would be needed in the future to distribute to the newly formed yeoman class (White 1991: 62-3). And according to Davis, it demonstrated an unconscious act of manifest destiny long before the notion was even articulated to the American public (Davis *et al* 1972: 100-1).[78] By the 1840s, ranchers were pushing west in search of pastureland, while the collective will politicians were to encourage that general movement. William

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[78] The phrase was coined in 1844 by journalist John O'Sullivan who wrote that it was the "natural state" of the United States to rule over all of continental North America. It was an idea championing the inevitability of Anglo-American supremacy throughout the Western Hemisphere because Providence favoured those supporting the ideals of liberty and self-government (White 1991: 73).

Robbins in *Colony and Empire* agrees that by at least the 1830s popular culture was rife with stories of "conquest and civilization" coming out of the West (1994: 50). Richard White in *"It's Your Misfortune and None of My Own"* offers a more sophisticated analysis for the mass familial migrations of the 1840s and beyond. He suggests the doctrine assumes too much homogeneity among the public and ignores the issues of racism[79] and competing interests among a variety of social groups. Individual households, though they may have been exposed to the hype of expansionism, did not begin to act until the very early 1840s by which time it was a widely held and "deeply ingrained" cultural belief that moving west would improve one's financial condition (White 1991 73-5, 189). That was the motivation for moving west, and the beginning of large white migrations west of the Mississippi.

Western expansion was a constant political consideration of the United States from the time of Mexican independence. Mexico was a major obstacle to American interests. The threat of not having access to more land was seen as a threat to the nation's future ability to grow its economy and to raise its status within the interstate system. To ensure the desired outcome, the American government began a series of negotiations with the Mexican government to acquire the territories of Texas, New Mexico and California. These so called "negotiations" did not officially end until after the Gadsden Purchase in 1853 and America had finished annexing the Mexican Territories (Hall 1989: 148).[80]

Mexico was very vulnerable in its early days because it could not compete with the powerful United States. The opening of the Santa Fe Trail in 1821 only months after Mexican independence changed the internal relationship between the Mexican Territories and Mexico proper. Mexico had little political control over its northern regions or its citizen's economic activities. Trade between the Territories and the United States was more profitable than its internal trade. The opening of the trail made that situation worse (Hall 1989; 147; White 1991, 44-50). In an effort to save itself, Mexico tried to improve its fortunes by encouraging trade with the Americans; sadly, the government soon found they still were unable to regulate much less control the trade (White 1991: 44). Mexico was being overwhelmed by the economic power of the United States and within two decades had all but lost their northern territories. Mexicans living there could see their prospects for prosperity rising higher and faster than they would if they followed the Mexican government's prohibitions against trading with the Americans who were moving into their territories without the authorization of the Mexican government. Hispanic cattle-raisers were selling cattle, tallow, and hides to the Americans for more money than they could earn locally from their own people (1991: 49). It was not long before American cattle ranchers who were moving west out ahead of other American settlers came into conflict with natives and Mexican authorities.[81] These conflicts with the natives would last another forty-five years until 1866 before the last Indian war ended (Hall 1989: 231).

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[79] Anglo-Americans generally viewed the mainly *mestizo* population of the Mexican Territories "as a violation of the laws of nature" Weber 1992: 337).

[80] These negotiations were continuous, even throughout the war with Mexico that officially only lasted from May 13 1846 to February 2 1848 ending with the Treaty of Guadeloupe Hidalgo (Hall 1989: 204). The war was started by President Polk under the false pretence that the Mexicans had invaded America. The truth of the matter was that the Americans were fighting "a war of conquest" using the tenants of Manifest Destiny (White 1991: 81).

The effort by Mexico to improve trade relations with the Americans failed because the Mexican government did not have access to one of the main sources of revenue in the region. The Franciscan missionaries had built a large and powerful cattle empire that operated outside the control of the government. Under the Spanish, the Franciscan missionaries brought 164 head of cattle into Alta California in 1769. The number of animals grew rapidly in part due to good forage but also by the desire of the Franciscans to Christianise the native peoples. Known as "beef Christians," they deliberately increased the number of native converts into the Church by promising to provide their families with meat (Jordan 1993: 162). By 1834 the number of cattle had risen to an incredible 400,000 head[82]—reaching up to Sonoma, California, but mostly concentrated along the southern coastal regions (1993: 161,163)—under the care of almost 31,000 mission ranches (Rifkin 1992: 48). These settlements were chiefly self-sufficient in meat and only loosely connected to one another through trade in by-products. Hides and tallow were in high demand in the United States. They dried and stored some meat for their own use, otherwise it was left to the Indians, wild animals, or to simply rot. These practices continued right into the 1840s (Rolle 1969).

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[81] Certainly cattle-raisers in the New Mexico were experiencing the effects of overgrazing by the 1820s forcing local producers to move further away from local settlements outside its protective sphere and into conflict with others, including native tribes, competing for the same vegetation (Weber 1992: 311, 339).

[82] Jordan more conservatively estimates those numbers at between 200,000 and 400,000 by the 1830s (1993: 162).

To assert some kind of control, the Mexican government enforced a programme of *secularization* on the mission settlements beginning in 1834 after missionary activities had peaked around 1833. That is, missionary lands were seen as assets that would be sold-off to private owners. In protest, the missionaries slaughtered cattle by the tens of thousands and sold their hides. Cattle numbers were reduced to 29,000 from 400,000 plus head, and their hides sold to dissuade the sale of their land (Jordan 1993: 165; Rifkin 1992: 48). Until then, the Church had provided economic stability throughout Mexico and its territories. The Church created a situation somewhat analogous to the enclosure movements in Europe. As more of the land passed into private hands new economic class divisions emerged between wealthy land-owning ranchers and poor dispossessed farm labourers. Not surprisingly, many Hispanics, whose lives were disrupted for the first time by unemployment and underemployment, were alienated by these new conditions, driving many of them into frontier militia groups that would eventually bring civil war to Mexico (White 1991: 41-44). This disruption of Hispanic cattle production opened-up opportunities for Anglo-American ranchers to buy more land and any remaining cattle from the missionaries. It was the beginning of the cattle barons in the West (Williams and Stout 1964).

This situation further increased frontier tensions between the Mexican and American governments. In Texas, for example, Anglo-American migrants probably coming through Louisiana around the 1820s (Jordan 1993: 215) settled along the north-eastern shoreline of Texas where the conditions were ideal for cattle raising (Rifkin 1992: 68). As the number of migrants into Mexican territory grew, the Mexican government became fearful in 1830 that the growing trade between of these migrants and the United States would undermine the economic opportunities of its own citizens. Frustrations led to hostilities, with people being killed on both sides. Events led to Anglo-American ranchers simply declaring Texas an independent State in 1836. The American government immediately seized this opportunity to destabilize the situation and recognised Texan independence; however, they refused a petition by Texans to join the United States. That would have been a politically explosive decision since Texas was still a slave holding state (White 1991: 64-9). Many Hispanics simply abandoned their herds out of fear of conflict with the Americans and left Texas. The Texas government, in one of its first acts, declared all feral and/or abandoned cattle free for the taking. Cattle were rounded up by the thousands by ambitious cowboys and taken to markets in Missouri, Ohio, and New Orleans. In the end "Texans did not create their cattle industry, they simply took it over" (Rifkin 1992: 68).

Despite these setbacks, the Mexican government, missionary herders and independent cattle-ranchers would continue the struggle to grow their herds and communities reaching well into the Great Plains of present-day Texas, Arizona, New Mexico and California into the 1840s. Even after American annexation, it would still be another decade or so before the Anglo-American cattle rancher and cowboy began to dominate the landscape of the Great Plains. From the American point of view, the annexations presented Americans with an opportunity for exploitation of the region's people and resources. By the 1820s cattle-raisers throughout the Territories were benefiting from a considerable expansion of trade with the Eastern States for goods not usually available to them. In California ranching was the primary commercial enterprise; however, because of its remoteness that trade was mostly in hides and tallow (Jordan 1993: 167). Nevertheless, that trade was considerable. Between 1826 and 1848, California shipped six million hides and seven thousand tonnes of tallow to Boston. A sizable trade, given the poor transportation network, which Hall and Jordan believe is one of the key reasons for understanding the American government's desire to expand westward (Hall 1989: 193-5; Jordan 1993: 165).

Summary

This period is dominated by the interaction of two historical transformations: the continuation of ecological change and the application of an ideology of land-use based on the notion of private property. Together they provide an example of historical transformation within a capitalist world-economy.

What we find here are at least two different perspectives on the rate of ecological change. One is the long slow continuation of environmental change across the continent and the other is the intense over-use of the land in particular areas to satisfy the immediate social-political needs of people. Both trends constrain and condition human activity. Large areas of the North America did not have good forage for grazers (Crosby 1986: 288), even less so than in Europe. However, the "Europeanization" of the North American landscape continues as local fauna is replaced by more suitable forage from Europe. Cattle would continue to play a leading role in that transformation—they transport seeds and destroy natural habitats. The other more noticeable transformation is being pushed along by human activity. Cattle raisers and farmers alike continued to apply utilitarian values to the land, and one gets the impression from the historical data that environmental degradation was seen as a given and that the processes of degradation, at best, could only be slowed-down or manipulated with varying degrees of success, but not sufficiently to harmonize the entire system. That was certainly the historical experience coming out of Europe at the time. They did understand, however, that the land would recover if left alone. The way to do that was to relocate. Unfortunately, this was not a reasonable solution for everyone. In the eastern states, stock-raisers who were not willing to give up their livelihood would have been forced by economic necessity to allow overgrazing until the land could no longer support cattle, at which point the land could be foreclosed, depending on the financial state of the owner, or sold to developers, or simply abandoned and then reclaimed by someone else.

The overall core-periphery trend was to expand. This brought Anglo-Americans into conflict with the indigenous peoples and the Spanish/Mexican governments. At the frontiers these spaces were constantly contested, but in the end succumbed to the more powerful "globalising" system, namely the European system. That would be Robert Clark's position in *Global Life Systems* (2000). Similarly, Foster and Moore held the view that the core needs to incorporate more territory to supply its materials needs each time the nutrient cycle is broken. By examining the environmental and social inputs used in the raising and production of cattle we see that there were cycles of economic growth where cattle are successfully grazed for a time followed by a period of decline when productivity levels went beyond the carrying capacity of the land, at which time some form of social change became necessary. Since land was still widely available, expansion was the easiest most cost-effective response. From that it is possible to speculate that there was still no pressing need to develop technology, which is usually an innovation of the last resort. The only substantive technological change impacting cattle production was the introduction of riverboats in 1818. Cattle-processors adapted by relocating and building meatpacking plants along the shores of the Mississippi River. This was a significant reorganization given the lack of improvements in transportation technology. It was now possible to ship hides and tallow processed in the mid-west downriver to the Gulf of Mexico, where these commodities could either be sent to the West Indies, Europe, or back up the coastline of the Eastern states. Spatial development, therefore, was still the cheapest way to deal with any ongoing ecological problems and growing populations. In general, there was a deepening of core-periphery relations throughout the world-system that continued to result in.

The implementation of Jefferson's grid is a clear example of structures being transformed as a strategy to appease one social group at the expense of others for the sake of social-political stability. Jefferson's grid was in an American adaptation of the European "enclosures" differing only in that the ownership of the means of production was more widely distributed, and for that reason, it would favour only some people that belonged to a particular social group, namely the yeoman class, over others. It was different to the enclosures in that the ownership of the land would not just accrue to the traditional members of the upper class. Neither was Jefferson blind to the implications of what he was doing. His decision to create the yeoman class was an attempt to reorganize American capitalism without making fundamental change to the economic system. In the end, his efforts simply resulted in the addition of another level of stratification within the capitalist world-economy. His was an adaptive strategy to legitimize the commodification of the land. He made a choice preserve the existing economic relationships, though the historically specific gaol was to preserve the social-political stability of a young nation. And though he may not have intended any deliberate attempt to destroy the ecology, his notion of land-use was based solely its capacity to fulfill human needs. The eighteenth century begins to demonstrate more clearly that cattle-raising in the Americas was not a natural state of affairs. It was a human strategy to manipulate animals and the land for benefit human patterns of consumption. 'Jefferson's grid,' as a system of land and wealth distribution, was just another form of privatization that only acted to intensify the ecological pressures on the land. Though still in the periphery, these processes were empowering the United States to become a player within the interstate system. The pattern emerging shows that the more powerful and organised states become within the interstate system, the more dependent they become on spatial expansion to solve its ecological and social problems—surely Turner's view that the movement west for moral and peaceful reasons is discredited. And finally, the period shows how people and institutions try to respond to changing circumstances without changing the fundamental structures that organise the relationship between societies and nature.

CHAPTER 4 CATTLE BARONS AND MEATPACKERS, 1842 TO 1920

> [It is to] the frontier the American intellect owes its striking characteristics. That coarseness and strength combined with acuteness and inquisitiveness; that practical, inventive turn of mind, quick to find expedients; that masterful grasp of material things, lacking in the artistic but powerful to effect great ends; that restless, nervous energy; that dominant individualism, working for good and for evil, and with all that buoyancy and exuberance which comes with freedom—these are traits of the frontier.
>
> Frederick Turner (Turner 1893: 18).

> The truth is, we are all caught in a great economic system which is heartless.
>
> Woodrow Wilson, 1912 (qtd. in Robbins 1994: 103)

This was the pivotal era in the social history of cattle-raising. It was a major *conjoncture* between the ideology of land distribution within a capitalist world-economy, economic growth, technological innovation, and the carrying capacity of the land. This convergence of trends was intensified by the migrations of Anglo-Americans west in the hope of improving their material wealth and social status, by the capitalist class taking advantage of advances in technology to control production and concentrate wealth in their hands, and by the continuing decline of agricultural capacity in Europe and the eastern states in the face of growing urbanised centres whose connections with “foodgetting” (Friedmann 2000)[83] had been severed by the processes of commodification. This is in contrast to Turner’s notion that a morally superior nation of rugged, selfless individuals conquered the continent. Critic Richard Slotkin in his book *The Fatal Environment* sees Turner’s thesis as presenting an important but misguided frontier myth that is a cover—a signifier—for capital formation (1994: 47). The broadening of the capitalist world-economy has its own momentum that is not easily undone by the agency of determined individuals without access to power and finances. Capital formation is a powerful process that introduces massive social, economic, and ecological change. Investment in Cattle-raising and processing facilities for the production of food has become a highly romanticized myth that has long since obscured a very intense period of capital formation in the cattle industry, and the American west in general.

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[83] Foodgetting is sociologist Harriet Friedmann’s notion that the power and wealth of civilizations has always been built on agriculture, which by necessity has always altered the concentration of plants and animals. And since before the beginning of the capitalist world-economy, societies that did not look after their resources had to expand their territories. Today the industrialisation and specialization of agriculture occur within the logic of capitalist economic relationships have grossly separated people from the natural cycles of nature. American settlers were to become “more deeply embedded in markets than in the earthly cycles of the Great Plains” (2000: 492). Cattle production have been part of that ‘economic embeddedness,’ as Europe tried to secure food sources from further a field.

Historically, mining, which Rodman Paul argues in his book *The Far West and the Great Plains in Transition, 1859-1900* (1998), was the main reason for the movement west tends to see cattle-raising in a more supportive role. However, cattle-raising was major sector of the North American economy in its own right. It was one of North America's main commodity frontiers. Cattle were not just food sources; its' by-products were certainly more widely traded and had a greater direct impact on transforming the land and its people than did mining. From the point of view of a commodity frontier, it was a key set of inputs deepening the core-periphery relationships within the continental United States and between the United States and Europe. Incorporation, during this period, was happening at a much faster pace now, not because of the exuberance of its people, but because of the opportunity to access large tracts of land cheaply. By becoming cattle-raisers, people saw an opportunity to increase material wealth and gain independence from a life of wage labour in the east. In many ways, however, it was a false hope rooted in the notion of the yeoman farmer. Life on the frontiers was subject to the same commodification processes that had been steadily moving people away from the highly integrated "seed to plate" food system of the American Colonists to growing dependence on an agricultural system based on productivity requiring greater divisions of labour. This process of specialization in cattle-raising developed into a "multi-staged system of production" (Heffernan 2000: 61)—a commodity chain. Cattle-raisers, located in remote areas, needed access to markets for their product and businessmen seeing an opportunity began to act as 'middlemen' between areas of production and distant consumers in urban centres who no longer had direct access to the cattle-raiser. These businesses, by obtaining outside capital investment, moved to restructure and reorganize the production processes by creating a network of horizontally and vertically integrated business practices. Through these companies—essentially the Cattle Barons, the stockyard owners, and the meatpackers—they were able to take control of the beef industry by concentrating capital and power in institutions that exercised control over the food production process. Individual cattle-raisers increasingly were caught in an unequal power relation mediated by corporations whose interests in land and labour were determined by how cheaply they could be acquired (2000: 61-75).

Under these conditions of production, the land deteriorates. When the short-term need to 'make-a-living' is juxtaposed against the long-term regenerative needs of the environment it is difficult for people to act other than in their own immediate interests. Choices become conditioned by the need to survive within the logic of capitalist economic relationships. That is, actors are constrained and conditioned by the existing sets of social "rules," making it unlikely that they will act in novel or unpredictable ways, especially when faced with the possibility of losing their land, their cattle, their meatpacking businesses—their livelihoods. Survival in a capitalist world-economy, therefore, depends upon the immediate utility, not sustainability, of social practices. This was apparent after the environmental crisis in the 1880s when the capacity of the land to sustain cattle production collapsed. The land was repeated overgrazed and overstocked during a time of drought, which ultimately led to the death of thousands of cattle. Nevertheless, within a few short years cattle-raisers wanting to recover their incomes were under pressure from meatpackers wanting to keep beef prices at affordable levels offered the lowest possible price per head of cattle to the producer. What followed was an attempt to return to higher levels of productivity as the land allowed it, but there was no attempt to manage the land in more sustainable ways.

Cattle Barons and the Capitalist World-economy

The single most significant trend of the nineteenth century, notwithstanding the other major issues of the time, namely deforestation and growing population, was the continuing ecological exhaustion and loss of Europe's soil. The period from 1830 to 1870 was particularly bad (Foster and Magdoff 2000: 43). There were limited supplies of food for people, but also on forage for cattle. One strategy by the British government was to change its trade policy and lower import tariffs on livestock trade in the early

1840s in an effort to generate more American interest in trans-Atlantic trade (Walsh 1982). This was an opportunity for the Americans to break Britain's dominance over this trade. From the 1840s to 1931 Britain was still intent maintaining its hegemonic position within the interstate system by continuing to impose "unilateral" trade agreements on its trading partners. The United States, on the other hand, was seeking to resist British dominance by growing their economy through multilateral and bilateral trade agreements with other nations (Arrighi 1994: 71). Over time, the United States was becoming wealthier as a nation. Its economy was growing bigger than Britain's, and more importantly the British now had to negotiate with the United States to get access to American resources. This transition was undermining Britain's historical role in the core. The Americans on the other hand could grow their economy by expanding internally within their own territory (1994: 58-9). The trade in beef was playing a significant role in the growth of the American economy by the offsetting declining beef production in Britain. What allowed the American economy to grow was its ability to supply cheap resources to Britain and other parts of Europe (Crosby 1994: 187; White 1991: 550). For Europe, American, as well as Canadian, resources were a major factor in relieving the growing domestic industrialisation and urbanisation, which after the 1880s meant increasing pressure on their land's resources.

The impact of soil exhaustion was followed by several serious bouts of cattle diseases. Both Britain and continental Europe had been experiencing a series of cattle plagues—*pleuropneumonia epizootic*—since the 1840s (Carlson 2001b: 123),[84] followed by a severe outbreak of anthrax in Britain in the 1860s. Irish and English cattle-raisers were devastated, sending beef prices soaring as local sources disappeared (Paul 1998: 198; Rifkin 1992: 87). There were recurrences of the disease as it continued to spread from one herd to another, eventually forcing the British Government to order the slaughter of virtually every animal and impose strict restrictions on imports in 1886. England's cattle industry was wiped-out, which was particularly distressing to the English, who were the most able to afford beef as a regular part of their diets (Carlson

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[84] This may even have been due to the poor quality and inadequate quantities of forage because of soil exhaustion, weakening cattle's immune system and making them more susceptible to disease.

2001b: 123, 172).[85] The situation did not improve until after 1868 when the first live shipments of cattle began arriving in earnest from the Americas (Steinberg 2002: 130). Most were slaughtered upon arrival and sold as 'English Beef' (Carlson 2001b: 123-5), while others were no doubt used to replenish Britain's depleted herds.

Britain's response as the world's leading creditor was to ensure a future supply of raw materials by controlling the forces of production through investment. Britain's overall overseas investment between 1865 and WWI show that fully 34 percent of it went to North America (mostly the United States), with most of that investment going to railroad construction and other infrastructure, an absolutely necessary component for the mass shipment of beef. For Britain the quickening of the American industrialisation process was part of its national security program (Robbins 1994: 86-7). This was especially the case after the Civil War when British investment helped Americans to overcome their own "internal spatial barriers" (Arrighi and Silver 1999: 78). Some of those investment dollars would also take notice of the growing possibility of shipping live and refrigerated meat across the ocean. Moreover, a British Royal Commission confirmed for investors that it was possible to clear an average annual profit of thirty-three percent on an investment in cattle-raising enterprises. These English and Scottish 'Cattle Barons' bought-up land and leases to land and then had an American rancher run the cattle-raising operation in their absence (Paul 1998: 198-200).[86] The results were staggering; American exports of cattle and beef to Britain increased by fifteen fold from 1876 to 1880 (White 1991: 261). Investment was further spurred-on by the quality of beef coming from the United States; it was much a fattier cut of meat and was very popular among Europe's beefeaters. A testament to the changing interstate relations can be seen in the growing annual trade deficits the United States was running with Britain from 1843 to 1914, amounting to $3,700 million per year (Arrighi 1994: 270; Arrighi and Silver 1999: 132-3). For Britain, investment in America was a necessary step for reproducing and maintaining their dominance within the interstate system. Investment in the

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[85] This capacity is consistent with Britain's hegemonic position within the world-economy.

[86] British investors invested $45 million in western livestock; still most investment came from Boston and New York; yet many individual bankruptcies were common across the west (White 1991: 262, 267). No doubt most of those bankruptcies were migrants from the east seeking a new life. Global financing was becoming more accessible with the invention of the telegraph in 1866 and the use of the gold standard in 1878 (McNeill 2003: 262).

Americas was the best way for Britain to ensure that the surpluses of American beef production were shipped back to Britain.

Ranchers, therefore, saw cattle as a means of accumulating wealth rather than a food source. In general, historian Richard White suggests that many Anglo-American settlers saw the west as a large collection of "commodities" where "things" were valued according to their utility (White 1991: 212). The west was seen as an opportunity to increase one's prosperity. Certainly this seems true of cattle-raisers. Ted Steinberg in his most recent book *Down to Earth* cites as evidence for this claim that since there were no food shortages in the United States, which would force cattle-raisers to overgraze or overstock the land beyond its carry capacity, then the only reasonable explanation for these actions in the New World are the systemic pressures generated by capitalist practices that prioritise cost-efficiency (2002: 129).[87] And since there were no countervailing forces to protect the environment from these pressures, there would be no social-economic reason to change. The priorities of Britain and the United States were economic and political. Britain wanted to maintain its hegemonic position in the core by securing cheap beef from the Americas, while the United States was trying to emerge from the periphery by developing its cattle industry.

Cowboy as Migrant Labour in the Cattle Industry

In contrast to Turner's Thesis, White suggests that Anglo-American pioneers had little interest in life on the frontier beyond its economic opportunities. It was a lifestyle to be endured for a time and then "transcended" when prosperity arrived (White 1991: 236). The decision to migrate[88] west came with the promise of owning and working a plot of land, and according to geographer Paul Starrs in *Let the Cowboy Ride* the attraction of following the trails west for thousands was bound to the idea of living-out the ideals most associated with *manifest destiny*, a very popular idea at the time (1998:

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[87] The issues of American environmental degradation were worse in the American west than they were in the eastern states or even most of Europe because of its different environmental make-up. The 98th meridian is roughly divides eastern pastures from the semi-arid landscape of the Great Plains, and the American Southwest in general, where the impact of cattle-raising on the vegetation and riparian areas is much more severe (Paul 1998: 222).

[88] White records that migration patterns show that there is a relationship between the patterns of settlement in the west and the dispersement of European forage plants, and to a lesser extent to areas where livestock would thrive. Moreover, people generally migrated along similar latitudes that they were living at in the east (White 1991: 184).

41-2). A notion very closely associated with economic prosperity as Providence's reward for the uprightness of the American character. Unfortunately, and contrary to Turner's Thesis, there was very little upward mobility in the west; for most the move west resulted in failed opportunities and long hours of work for little pay (Slatta 1990: 224). The distribution of wealth and income virtually mirrored those divisions of labour in the American east (White 1991: 285). Still, many made the trip in the hope of benefiting from one of the main activities of the nineteenth century—the privatization of public lands (1991: 137). Yet, one of the great ironies of this transformation was that it was not poor households emigrating; it was generally those households that could afford to buy the supplies with cash or through credit that made the move west. The poor who were able to move west usually went as individuals and ended up as wage labour for ranchers, forestry, or mining operations (1991: 185). Those who had earmarked cattle ranching as a means to a very profitable end would be for the most part, sadly mistaken.

Those cowboys of myth were simply ranch hands; they were not owners of the means of production, but wage labourers whose surplus value went to the rancher/owner—typically an outside investor. A cowboy earned low wages, typically $25 to $40 per month in the 1870s (Rifkin 1992: 71),[89] which amounted to much less when averaged-out across the whole year because ranching was seasonal affair and other employment opportunities across the west were limited (Slatta 1990: 98). Ranchers generally employed cowboys when cattle needed to be driven to slaughter; otherwise ranching was not a labour intensive activity, which sent many a cowboy to the unemployment line and into the taverns with reoccurring regularity. Contrary to the Turner Thesis, the cattle frontier never promoted democracy or any form of 'social levelling' (1990: 221-4).

Cowboys were usually loners, uneducated, hard drinking, irreverent, and violent men. They worked on the far reaches of the cattle frontier most likely to escape the reach of the justice system (1990: 46),[90] and in actuality, they had little respect from the public.[91] The myth of the cowboy as "representing rugged individualism, unbending principle, frontier spirit, and manly courage," is highly exaggerated and likely popularized by Buffalo Bill Cody's Wild West Show (1990: 191). Today, however, cowboy imagery has been reconstituted in the form of good versus evil, where the cowboy is often used to portray the correctness of American values, evidenced by the success of John Wayne's movies in the 1970s and in the politics of President Ronald Regan in the 1980s (1990: 192). It is clearly "one of the most potent shorthand cultural symbols in America" (1990: 195).

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[89] Wages ranged from $35 per month in 1870 to $37 per month by 1909 and most cowboys did not even own their own horse (Slatta 1990: 97, 109).

[90] In stark contrast to this are Gene Autry's cowboy commandments of the 1950s: "The good cowboy never takes unfair advantage, keeps his word, tells the truth, is gentle with children, the elderly, and animals , is tolerant, helps those in distress, works hard, respects women, his parents, and the laws, does not drink or smoke, and is patriotic" (Slatta 1990: 195).

[91] This imagery is easily contrasted with cowboys of the time in Canada, who were for the most part thought to be civilised. The differences (perceived or otherwise) prompted a writer for the *Calgary Herald* to write on 12 November 1884 that the "rough and festive cowboy of Texas and Oregon has no

Though restive and often drunken, the violence attributed to the Wild West's cattle towns was probably overstated. White goes so far as to suggest that those few individual acts of violence have been mythologized to deter the examination of deeper forms of systemic violence directed at class, racial and gender differences. In reality the government repressed some forms of violence, while other forms were encouraged (White 1991: 328ff.).[92] However, there was a strong tendency to violence by cattle-raisers that was second only to those with mining interests. The violence usually erupted around weak or illegal land claims, tenuous claims to public lands, and/or accusations of cattle rustling (1991: 344-6).

Land Distribution: Homestead Act of 1862

The distribution of land was never as simple as the passing of an Act in Congress. Land claims were highly contested affairs among cattle-raisers as they competed for access to grazing land. Many resorted to fraudulent land claims and intrigue surrounding its use. There were land speculators who would buy land to earn rent. There were Hispanic ranchers, long established, who now found themselves subject to American laws of distribution with many losing their land as a result (1991: chapter six). All this is to say, that in practice the actual fair distribution of land was questionable with respect to the theory of distribution guided by the ideal of the yeoman farmer. There was a

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counterpart here. Two or three beardless lads wear jingling spurs and ridiculous revolvers and walk with a slouch, [but] the genuine Alberta cowboy is a gentleman" (Slatta 1990: 51).

[92] Violence was an "intrinsic" feature of social organisation in the west (White 1991: 251). For example, violence against natives was virtually always condoned and carried-out by the US government. Treaties with native groups were signed and then ignored as expansion west continued under pressure from ranchers and farmers and was commonplace throughout the 1850s and 60s (1991: 90, 94), Robbins observes was probably due to the inability of Anglo-Americans to incorporate natives as labour into the world-economy (Robbins 1994: 49).

contradiction between Jefferson's idealism and ranching, focused around access to enough pasturage (Starrs 1998: 44). However, the Homestead Acts did give us a template of how the activity of land distribution was enabled and largely practised; and more importantly, it reveals how notions of land distribution and ownership are conditioned by a set of specific social relations surrounding access to a means of production.

Before the Homestead Act of 1862, public land was essentially auctioned-off in rectangular sections for at least a $1 per acre, reaching $2 per acre in the early decades of the nineteenth century. This practice of auctioning parcels originated in the Land Ordinances of 1785 and reaffirmed in the Preemption Act of 1841 under which land was sold in square half-mile sections of 160 acres. Between 1796 and 1863 public lands were sold at auctions mainly in Philadelphia, Cincinnati, and Pittsburgh; although, other centres would emerge as the availability of land moved out into the territories. Auction centres would move further west as the land surrounding each centre was claimed and settled (Davis *et al* 1972: 102-103; Starrs 1998: 53). However, abuses were rampant. In Iowa, for example, land speculators bought two thirds of the land auctioned by the government during the 1850s and 60s, and then resold it for a profit, often on credit (White 1991: 141). Yet, it was for precisely this reason that the Homestead Act of 1862 was enacted. It was meant to stop land speculators by allowing each settler to settle and work the land for five years to receive full title or they could purchase the land after six months of settling the land with no promise to cultivate it. In essence, the Jefferson ideal of the yeoman farmer was an early reformist attempt to commodify the land and people (Steinberg 2002: 59-61). The Act merely codified this vision without making any allowances for ranchers, miners, or railway companies (White 1991: 143). Some subsequent revisions to the original Act were made; first to the Act of 1909 by increasing the number of acres a settler could buy to 320, and then again to the Act of 1916, which allowed for the purchase of 640 acres; however, neither Act ever sufficiently addressed this ongoing problem for ranchers or farmers (Hill 2003: 9).

Though thousands would benefit from these Acts, it really only ever formalised the notion of a quarter section as the basic agricultural unit in the west (Schmitz, Furtan, and Baylis 2002: 33; White 1991: 137-8). Otherwise, the Act was an underwhelming success in terms of reducing the number of poor in eastern cities by giving them access to farmland (White 1991: 142-3). Jefferson's goal to establish a yeoman class as a countervailing force to prevent the concentration of wealth in the hands of the upper classes was thwarted. Neither was it very useful to ranchers who typically (and one supposes conveniently) saw the land as a part of the 'commons.' In other words, ranchers simply using what resources they needed, sometimes through intimidation of others and/or by making fraudulent claims to land. State and Federals governments generally ignored these abuses, until the last decades of the nineteenth century when improvements in transportation technology led to increasing pressures to supply beef to Europe. This increased competition and tensions over access to land and water. Ranchers, who had gone-out-on-the-land ahead of crop farmers, believed they were entitled to some usufuctuary privilege despite their claims (Starrs 1998: 44). Unfortunately for ranchers, there was little agreement to these claims. This often resulted in violence between competing ranch operations, requiring the Federal government to exercise greater control over the land and its resources. It tried to do this through the enactment of a number of Acts meant to control access to resources, restrictions ranchers continued to ignore. Tension around these issues only increased as grazing lands deteriorated, culminating in the 1887 collapse (1998: 53-5).

John Wesley Powell

In the end, the competition for grass and pressure from farmers buying western land forced many ranchers to buy these smaller plots of land or abandon their herds. This was especially the case after 1887, when the loss of healthy grazing land made it an imperative. If ranchers did not start buying some land, they would eventually lose access to it completely to crop farmers making legitimate land purchases from the government (1998: 54-5). That, despite the recommendations found in John Wesley Powell's 1878 report on *The Lands of the Arid Region* in which he suggested land parcels be increased to at least 2500 acres to accommodate cattle grazing. Ultimately, he thought the 'grid' system was far too confining in the West where resources were sparser and called for community ownership and regulated communal use (Starrs 2002: 11-13). Ultimately, these recommendations were never introduced because land speculators were able to convince the government that Powell's plan would threaten a very profitable business (Starrs 1998: 55-6), despite the evidence that ranchers could not operate within such fixed and restrictive boundaries. The government was reluctant to deviate from a long-standing ideology that the family farm was the most ideal mode of production, so the Federal government tolerated a range of extra legal activity (White 1991: 148). Ranchers did not want the land privatized under the conditions of Jefferson's grid. Ironically, they and the timber industry protested once again when the Federal government stopped any future privatization of public land in the 1880s and started asserting "permanent public ownership of portions of the remaining public domain" (1991: 391). Perhaps this was just as well, since the effectiveness the Homestead Acts and other Land Acts between 1860 and 1900 were always of questionable value in the eyes of the rancher (Starrs 1998: 54).

Meatpackers and the Commodification of Beef

The meatpacking industry arose in urbanized centres looking to respond to the demand of consumers. However, meatpacking as the vertically integrated[93] businesses we know today did not begin to develop in the United States until the 1860s and 1870s, and not until the 1890s in Canada (MacLachlan 2001: 123). As a practical matter, sufficient numbers of cattle could not be raised within such close proximity to densely populated urban centres, so meat would have to be brought in from greater distances. That this was necessary is self-evident; however, how that process was structured reflected the ideology of accumulation.

From the early 1840s to the 1870s meatpacking transitioned from its pioneer status to a "genuine manufacturing activity." In the previous period, meatpacking between the 1800s and the 1840s was performed mostly by "farmer-packers," who owned and operated small, local slaughter houses that killed and cured meat for their own use and took surpluses to market towns along the Mississippi (Walsh 1982: 7). Public stockyards were also in operation in those urban centres. Cattle were brought into town by independent drovers and sold to the local butcher or bid upon by a number of butchers (MacLachlan 2001: 100).[94] What was changing after the 1840s was the ability of capitalists to engage in the beef trade in ways that were more lucrative than in the past. The slaughter process was becoming increasingly commodified, and nowhere was that more apparent than at the meatpackers of Chicago.[95]

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[93] As vertically integrated businesses, beef packers owned "livestock companies, railroad terminals, railroads, stockyards, machine supply companies, warehouses, land development companies, public utilities, publishing houses, sporting goods companies, banks, and hundreds of other businesses" with assets estimated in the billions of dollars (Rifkin 1992:116). Vertical integration was the key to America's economic success in competing for market share in Europe during this period; however, unregulated competition leads to social instability (Arrighi 1994: 282, 286; Sklar 1988: 53).

The meatpacking industries were creating a beef commodity that was now generating inter-city, inter-regional, and more intense global competition than ever before. However, intense competition between local stockyards was hurting the process of accumulation for each of them. Therefore, the first 'Union' Stockyards opened in Chicago, mainly to eliminate the unfair bidding practices employed by the stockyard owners (Cronon 1991: 210).[96] Through an Act of the Illinois legislature the Union Stockyards and the rail companies connecting the stockyards to other urban centres became one large corporation. It was a move by the government and businesses to create a more efficient means of production (and thereby increasing profits) to compete on a larger scale (Walsh 1982). When it opened on Christmas Day in 1865, the stockyards had a daily capacity of 21,000 cattle, 22,000 sheep, 75,000 hogs, and 200 horses. It was an immediate financial success and became the world's largest meatpacking centre (Cronon 1991: 210; Williams and Stout 1964: 19) recording annual profits at around $150,000 in those first years (Wade 1987: 56). Chicago was the beginning of the industrialisation of America's last cattle frontier. It would become the model for dozens of other municipalities competing throughout the region (MacLachlan 2001: 102). In the American Midwest, by the 1870s a few major centres were surrounded by hundreds of smaller operations that served local markets. Though never on the same scale as

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[94] Markets similar to these have been operating for generations. The first recorded event like this was by Smithfields in London England in 950 AD and did not close until 1855 because of lack of space (MacLachlan 2001: 101).

[95] Other meatpackers were in operation as well; however, Chicago was the biggest operation and symbolic of a process that was occurring at various rates and intensities throughout North America as each area was becoming more deeply integrated into the world-economy, and clearly, this process was much further along in the eastern shorelines of the United States and in Europe. What is unique about the Chicago example is that the process of commodification is much clearer since Chicago was essentially the only major player in a huge region with obvious frontiers.

[96] Stockyards were public places in the sense that anyone could bring cattle to the market to buy and sell their cattle, but each stockyard was a privately owned business that competed with the other stockyard owners to buy the drovers' cattle. 'Union' Stockyards were regulated marketplaces to prevent price fixing, which was apparently a common practice.

Chicago, they included Kansas City Stockyards in 1871, St. Louis in 1873, Cincinnati in 1874, Indianapolis, 1877, Omaha, 1884, Denver, 1886, St. Paul in 1888, Fort Worth in 1893, Sioux City, 1894; and St. Joseph in 1896. Their success was due to their co-locating the stockyards with rail terminals, slaughterhouses and butchers, making these 'gateway' cities to the American West, linking society and nature (Cronon 1991: 307).

The wide-open spaces of the countryside became sites of production for the cities. Moreover, the greater the needs of the city the more space for food production and resources it needs. And though this seems counterintuitive, the greater the distances the more profitable the production process becomes for the capitalist investor. One reason for this is that local markets are highly governed and protected; therefore, the capitalist class prefers to operate above these constraints and at a distance (Braudel 1982: 412). Distance between consumers and producers are an essential condition for the extraction and transfer of surpluses, hiding the environmental and social abuses and conditions created by capitalist economic relations.[97] In terms of the cattle industry, the *free* access to North America's natural capital (namely grass) motivated investors to begin investing in companies that would build and extend railway tracks into the cattle-raising regions (White 1991: 246). Therefore, it is important to understand how the meatpacking centres link urban and rural sites through capitalist financing.

William Cronon in *Nature's Metropolis* offers a unique perspective. He is convinced that the "environmental or economic history of the Great West" cannot be understood "without exploring Chicago's nineteenth-century hinterland" (Cronon 1991: 265). He is concerned about the perception that town and country are independent of one another, which feeds the notion (and fantasy) that humanity has escaped the limits of the earth (1991: 17-8). Rather, the capitalist imperative to grow markets has necessarily led to the incorporation of more land. This has been especially true as advances in transportation connect more distant areas, which in turn gives corporations more control over the production process, giving them more control over how the environment is used and more control over access to cheaper resources (1991: 212). In that sense, the Chicago stockyards represented a (capitalist) triumph of human will over nature (1991: 12). So quite naturally, Cronon's discussion emphasises that any urban centre and its hinterlands are inseparably interdependent. For him, the historical role of Chicago's Union Stockyards epitomises this relationship between nature and capital formation, which acts to connect the producer and consumer and ecological deterioration.

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[97] What were not so easy to hide in Chicago were the social effects of becoming an industrialised centre for agribusiness. With intensive meatpacking came concerns about public health. In 1862 water pollution was already a major problem. Offal and blood from those packinghouses had run thick in the river since 1851. Water pollution and air pollution from the smell of rendering tanks and the dumping of offal in fields were constant companions of the meatpacking industry. Legislation was often ignored because a fine of $25 was not a threat to business. Cholera reappeared at the end of the Civil War that awoke fears in the public. Leading to stricter hygiene standards and finally, a board of water commissioners tried to deal with problem, in 1864 a two-mile tunnel was constructed, and the city built more sewage systems to handle the problem and increased sanitation enforcement. By 1893, Chicago was an environmental leader compared to other meatpacking centres. (Wade 1987). The real reason this is arguably that both Canada and the US were in danger of losing their access to British markets in the late 1880s. The British were concerned about the "alleged" accusations over the questionable hygiene standards of packinghouses. There was also concern about sick and diseased animals being slaughtered for food; and it was this pressure from Britain led to the United States to implement its first quality control legislation in 1891 to have meat inspectors physically confirm the quality of the meat (MacLachlan 2001: 126-8). Moreover, between 1885-6, 90,000 people died of water borne diseases in the Chicago area because of pollution from the

To support that conclusion he analyses the relationship between financial centres and small businesses in outlying regions. There he finds that the more integrated and concentrated wealth is in the financial centre the more spatial expanse is required to feed that centre (1991: 340). The ability to extend credit to small businesses was an essential tool for creating socio-economic ties between them and the business activities of the financial centre. "Without credit," Cronon writes, "frontier economies would quickly have collapsed" (1991: 323). Small retailers—the old General Store—located in the hinterland needed to establish credit with large financial institutions located in the urbanised centres so that they could stock their store's shelves with needed supplies and keep them on hand for immediate sale and distribution. This is in contrast to much larger businesses in the cities, which had greater access to transportation and goods, tended to act as distribution nodes for the hinterland. This allowed metropolises, like Chicago, to become regional wholesalers (1991: 323).

Since it was difficult to track the actual flow of capital given the tendency of corporations to secrecy, he suggested the best way to see if this urban-rural relationship exists was to look at whom the creditor was when individuals filed for bankruptcy (1991: 269-70). What he found is that when you plot the bankruptcies of each county and

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stockyards and a poor city sewage system. The city responded by introducing a massive sanitation project, which in fact brought clean water by 1900, but it now meant polluted water downstream for residents along the Illinois River and into the Mississippi (McNeill 2000: 126).

connect them to their creditors, the creditors to whom the money was owed were financial institutions in the metropolis. Chicago emerges as the world's largest meatpacker founded upon on the city's ability to simultaneously attract capital investment and to extend credit (1991: 304-5). In the end, a pattern emerges revealing Chicago's extensive financial and spatial networks linking it to small retailers in the hinterlands. Cronon's message in its most parsed-down form is that 'credit precedes growth' and demonstrating how financial cores deepen their hold over specific areas. However, it is an insufficient explanation of the social practices that result in need for credit. What we need to know is why bankruptcies and spatial expansion were occurring to start with. Spatial expansion is caused by the environmentally unsustainable practices of overstocking and overgrazing the land, creating a need to relocate, resulting in a search for technological innovation that allows for more efficient production over greater distances.

Chicago: Meatpackers and Monopolies

The years from the mid-1850s to the end of the 1880s represent a time of phenomenal growth in the United States, and for the nation it was a period of changing economic priorities. In 1860 the top six manufacturing industries were: flour and meal, cotton goods, lumber, boots and shoes (which are by-products of cattle production), iron founding and machinery, and clothing. By 1914 it was slaughtering and meatpacking, iron and steel, flour and gristmill products, foundry and machine products, lumber and products, and cotton goods (Ashworth 1952: 37-38).[98] The advent of 'ice packing' on freight cars beginning in 1857 at Chicago has been attributed to that change (Williams and Stout 1964: 12). Until then, the production and consumption of beef as a fresh meat product (trade in by-products was fairly widespread since the sixteenth century) was still a relatively locale affair; however, the introduction of this new technology would open-up regional trade (Slotkin 1994: 46). The ability to ship fresh meat attracted millions of dollars in investment that represented a major shift in historic patterns of investment

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[98] In 1914, 43 percent of the world's capital came from Britain and much of that went to the United States. The United States provided only 7 percent of the world's capital and it stayed mostly in the Western Hemisphere (Beaud 1983).

(Robbins 1994: 16-7). Cattle-raising in the American west was becoming a regional speciality, much like was at the "fringes" of Europe.

To sustain this success, the industry, which was centred on the Union Stockyards at Chicago, began investing in a variety of other technologies over the next few decades. There was renewed interest in cattle breeds;[99] rail construction began in earnest from the 1860s onward, the telegraph in 1866, fertilisers,[100] fencing in 1873, refrigeration in 1875 and the first refrigerated ships by 1878, and electrical lighting in the packinghouses in 1888.[101] There were financial changes as well that facilitated capital formation: the introduction of the gold standard in 1878 and the mass circulation of money after 1879. Also, once the Civil War ended there were intense migrations west by those seeking to start ranching operations, and much of the land was subsequently turned into pastureland to feed the eastern states. Moreover, by the 1870s British investors were very motivated by the knowledge that there were enormous grazing lands west of the Mississippi (Rifkin 1992: 63-4) that had the potential to be very profitable. They were also interested in investing in the infrastructure of the industry. For instance, by 1890 one British syndicate of investors controlled 95 percent of the stock for New York and Pennsylvania railways and the Union Stock Yards. British investment, in general, was now mainly going to the United States after 1870 (McNeill 2003: 262). Much of it directed that the livestock industry in the western region as it became more accessible to serious, large-scale investment beginning in the 1870s and continuing well into the 1880s (Wade 1987).[102] It was a time of unprecedented financial, technological, and social convergence, requiring the incorporation of more distant grazing lands now that the beef industry had the ability to widely distribute fresh meat within America and to Britain and the rest of Europe (Robbins 1994: 64).

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[99] In the 1850s, breeding experiments began in response to expanding markets and steer weights were up to about 1000lbs (Wade 1987). Environmental conditions in the West were quite different from Europe; it was found that the Hereford was the most widely suited (Carlson 2001b: 264).

[100] By the mid 1870s offal and other waste were being turned into fertilisers (Walsh 1982).

[101] This increased business was leading to logistical problems, since workers could only work during the day. When electrical lights were installed in 1888 workers could work in shifts and production could go on continuously (Wade 1987).

[102] For the packers the most money was made in the by- products. The meat business was profitable only as a result of these great vertically integrated corporations (Cronon 1991: 252-4). Though a French invention, by Mege-Mouries during the Franco-Prussian war and approved by the French health inspectors, oleomargarine was sold as a substitute for butter in 1872, he secured patents in Britain and the United States. The first plant opened in New York City in 1873 and it cost half as much as butter. It was big business by 1880; essentially beef grease with food colouring that was unhygienic and full of bacteria (Wade 1987: 102). Oleomargarine is the basis of all modern processed foods, and such a contested product. Canada banned it in 1886 until 1949 (Carlson 2001b: 135, 141), and was probably only allowed then because of war time rationing. Other by-products included neatsfoot oil, glue, ground bones, and fertiliser (Wade 1987: 107).

Supporting that development were the three big meatpackers of Chicago: Swift, Armour, and Morris. Each was worth millions with diversified business interests throughout the beef industry (Wade 1987), and each was striving to dominate the other. The competition was fierce and open to corruption and unethical behaviour because the industry was essentially unregulated by the Federal government. Pricing practices were an especial problem, which meatpackers tried to control by two methods. The first was through horizontal integration. Each meatpacker would attempt to own of large portion of the industry, such as the stockyards, so they could attempt to control pricing by having all the cattle pass through their stockyards. The problem is that by controlling only one stage of the production process the corporation was still susceptible to wide market fluctuations. Therefore, it was necessary to carryout a second strategy. Vertical integration is where corporations attempt to own a variety of the businesses involved at different stages of production. It was then possible to manage both the inputs and outputs throughout the production process without having to co-operate with other business entities (Arrighi and Silver 1999: 121-4). By following these two practices the meatpackers were able to concentrate power and wealth for themselves while externalizing costs to labour and the environment. At every session of the Illinois legislature, it had before it at least one bill that fought for a way to break the monopolies of the meatpackers (Wade 1987: 207). In 1888 Senator George Vest of Missouri stated that "the cattle pool of Chicago is the most infamous tyranny that ever existed in the United States" the proof of which came two years later when the Vest Committee of 1890 found there was collusion between the meatpacker's agents in setting prices (qtd. in Wade 1987: 210). Still, there was no political will to regulate such a profitable industry.

Rail: The Means of Distancing Production from Consumption

In the 1840s Chicago had a population of 25,000 and was becoming a centre for meatpacking. While most of the meat went to feed local consumption, in 1841 some 800 barrels of beef were shipped to eastern markets. By 1847 it was 49,000 barrels, with some of it travelling as far as Canada and England (Wade 1987). The first rail opened in

Chicago in 1848; making Chicago the most important connection between east and west (Cronon 1991: 92-3). For a sense of the change it brought; in 1848, 10,000 head of cattle were driven on hoof to the stockyards; by 1860, 75 percent of the 450,000 head of cattle arriving in Chicago came via rail; and by 1890, it was 3,000,000 (Wade 1987).[103] The role of rail in the 1840s and early 1850s acted as feeder lines into the old packers along the Mississippi and new packers in Illinois (Walsh 1982).[104] In 1850 the population of Chicago had more than tripled to 109,000 and had shifted from being a centre for the corn trade to the centre for meatpacking by 1862. Facilitated by 2400 miles of rail in 1856, after which 40 percent of the cattle produced in the region were moving to Chicago via rail, at which point it was shipped primarily by rail to the Eastern seaboard cities (1982).[105]

Access to rail transport was unquestionably a boon for the cattle-raising industry[106]. Ice packing had significantly extended the killing season and the ability to ship meat over greater distances; until that time, slaughtering was mostly a winter operation (Wade 1987: 105; Walsh 1982). However, once the financial benefits of increased production became apparent coupled with the ability to get fresh beef to consumers quicker, investors, driven by the British desire for beef, were highly motivated to invest in the expansion of the railways (Rifkin 1992: 88).[107] The Federal Government also had a hand in the process, lending money and giving land to rail companies wanting to build more tracks (White 1991: 146). Until those rail connections were made, ranchers continued to lose profit because pricing was based on the weight of the animal at the time of sale, and cattle would always lose weight during a 'cattle drive' (Cronon 1991: 224). But once those rail connections were made, the financial results were amazing. Livestock receipts tripled from 1870 to 1880 to 8.8 million animals, almost entirely due to the access to rail, which during that same period had gone from 11,000 miles to 23,000 miles of track (Wade 1987). Once rail had connected western meatpacking centres with markets in the east there was a corresponding intensification of land-use by the cattle-raisers that further aggravated conflicts over ownership of the land, which would ultimately end with the fencing of the west. However, these claims about the importance of railways can be misleading if taken on their own. Without the concurrent development of refrigeration or fencing the process of commodification of the beef industry might not have occurred.

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[103] The first actual use of rail to ship cattle to market was out of Lexington Kentucky in 1852 to the Cincinnati Stockyards (Williams and Stout 1964: 16).

[104] In the 1830s and 1840s, meatpacking was widely distributed along river towns. That changed after the 1840s and 1850s with the-introduction of the railways (Walsh 1982).

[105] "Before the railroad, livestock furnished their own transportation, moving in droves on the hoof, eating as they went. They might be raised to adulthood at scattered locations and moved to the market to be fattened. Before much refrigeration or refrigerated transport, slaughtering was a widely diffused activity. Long-distance shipments of fresh meat, which began in 1867, combined with economies of scale in slaughtering to push livestock production away from markets, finally locating it at the great stockyards in Cincinnati, Chicago, Omaha, and Kansas City" (Davis *et al* 1972: 377n7).

[106] The Illinois Humane Society for the Prevention of Cruelty to Animals was founded in 1870 by Edwin Lee Brown and John C. Dore, who had already had a bill passed ensuring that cattle were unloaded immediately, fed and watered upon arrival at the yards, but also that this had to occur for each twenty-eight hours of travel. Meat-packers wanted regulation to keep costs down, as they would lose money on sick or stressed animals (Wade 1987: 89).

[107] Railways Route mileage was 1930 miles in 1830; 2954 miles in 1840, 56,106 miles in 1870; 223,454 miles in 1870; and 319,000 miles by 1930 (Ashworth 1952: 63).

Refrigeration and Fencing

There were limits to the benefits to ice packing. To stay in operation year round and avoid financial loses when packinghouses were idle, the meat packing industry actively sought to improve the chilling process. The result was refrigeration (Cronon 1991: 231; Wade 1987: 104-107, 199-200). As ice-packing methods continued to improve the shipping and packinghouse conditions throughout the early 1870s, they were able to double beef production between 1870 and 1875, and then by another tenfold over the next five years to 1880. Most of the meat still went to traditional packers and canning factories, but in 1880 at least one quarter of all the animals killed were being shipped as 'dressed beef' (Wade 1987: 105).[108] Once 'ice-less' refrigeration was introduced in 1889, Swift and Armour, seeing the opportunities, began expanding their interests into all aspects of the beef producing process (1987: 200). This was also an opportunity for British investors still seeking to recover from their own losses from cattle diseases in the 1860s (Carlson 2001b: 105; Rifkin 1992: 87).[109] Early in the 1870s, open-deck shipments of fresh beef were regularly making their way to Britain, and by 1875 chilled carcasses were sent in "refrigerator holds" (Wade 1987: 107).

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[108] Dressed beef are stock that have been chilled and quartered, which meant the meatpackers no longer had the expense of trimming, curing, or preserving the meat (Wade 1987: 105).

[109] In 1871, Britain faced a food crisis brought on by cattle disease. In the 1850s, Britain could nearly look after its domestic consumption of beef, importing some live animals for slaughter; however, consumption was beginning to outpace production that was made worse by the catastrophe of 1871. Domestic production had risen only slightly; however, consumption rose 25 percent mostly due to population increases from 75 pounds per person per year in 1860 to 110 pounds in 1882, 40 percent of which was imported (Clark 2000: 196-8).

Within the United States iced beef was not popular with consumers or butchers because it was thought to be "unsanitary." However, the ability of meatpackers located in distant cities to undersell locally produced beef together with the desire (and perhaps the need in many cases) of consumers for cheap goods 'forced' the acceptance of dressed beef into the marketplace (Cronon 1991: 244).[110]. With the advent of refrigerated railcars, dressed beef[111] could be transported at much lower costs than live cattle, mostly because, unlike today's highly industrialised slaughterhouses, much of the animal in those days went to waste—as much as 55 percent of the animal (Carlson 2001b: 121; Cronon 1991: 235-6). By shipping dressed beef, the meatpacker only had to pay to ship meat that could be sold at market. More savings were made when refrigeration became available in the packinghouses where they could chill beef carcasses on site. Refrigeration brought nothing but good and capital investment went from $8.5 million in 1880 to $39 million in 1890, while cattle kills went from 400,000 to more than 2,000,000 producing from 60 million to 964 million pound of chilled beef (Wade 1987: 199). Distances were no longer an issue within the continental United States. Rail and refrigeration had erased most spatial barriers and opened the American west to future development as a producer of meat. The down side, was technological innovation attracted more capital leading to oligopolistic practices by the meatpackers by the mid-1890s (Steinberg 2002: 192; Walsh 1982).

The impact of these changes, both regionally and globally, led to great demands from English and Scottish investors to import more beef to close the gap between their depleted herds and consumption. The result was much higher prices as production raced to meet demand. That led directly to the overstocking of the land in the United States. The unintended consequences of which led to a land grab and a means to mark those claims. At first hedges were tried, but the invention of barbed-wire soon came to dominate the landscape as means of protecting investments in herds and hoarding pasturage for themselves (Carlson 2001b: 104-7; Gray 1968). Individual ranchers who could not afford to buy so much land simply fenced public lands (White 1991: 150). In some areas fencing *de facto* allowed farming and ranching to coexist, instead of forcing ranching into new frontiers (Slatta 1990: 180).

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[110] By this time local butchers were conceding defeat when as a trade they began to recognize "the commercial genius of the men who can kill cattle in far western points, lay the cattle down at the most remote New England crossroads and sell at proceeds lower than the bare costs of raising and killing native animals" (Wade 1987: 198).

[111] The ability to ship dressed beef severely disrupted the existing beef industry. Butchers and local slaughterhouses were put out of business. Even the railways suffered, since freight charges for live weight cattle were higher. The other impact of "Dressed beef brought the entire nation—and Great Britain as well—into Chicago's hinterland" (Cronon 1991: 238-9).

Fencing had two major impacts. First it led to more concentrated overgrazing and second these *enclosures* led to decreases in cattle diseases, like cattle tick and parasites (*babesiosis*). (Carlson 2001b: 113; Steinberg 2002: 109, 132). The applications and innovations leading to technological change were "based on the streamlining of nature" (Steinberg 2002: 56). Fencing (a means of organising production), drought, and severe winters put strains on cattle raising processes that eventually led to large die-offs: first in Utah in 1879, quickly followed by die-offs in Colorado and Nebraska the next year, and again in 1884-5 when some ranchers experienced a 90 percent death rate. The worst occurred in 1886 and 1887 when following a dry harsh summer that provided less forage than needed was followed by a harsh winter where cattle stretched from Texas to Montana were stopped from gaining shelter from the cold because of fencing. Millions of cattle died along the fence lines resulting in a die-off of over 90 percent of America's cattle on the Great Plains (Davis 1972: 406; Slatta 1990: 187; Steinberg 2002: 132). Recovery was further hampered by a nation-wide depression beginning in 1893, which "kept money tight until 1898" (Paul 1998: 203-5). What had seemed like a sure investment, because of the free grass and the use of land that was rarely paid for, had abruptly ended. Many cattle-raisers went broke and new investment disappeared overnight. Happenstance had created the conditions for a transition to much smaller individually owned operations in the 1890s (White 1991: 222, 226). The time of the open range was over, and was officially declared closed by the American government in 1890 (Rifkin 1992: 67). A subsequent shift to the modern-day ranch occurred, a hybrid between open range ranching and just plain stock-raising. Despite these set backs, North America had now become the world's largest pastureland.

Overstocking, fences, and nature produced a series of unintended consequences that served only to deepen the ecological problems. Beef shortages led to price increases after the environmental collapses of the 1880s, and yet again the ranges were overstocked and overgrazed resulting in another collapse in 1900. Fortunately, for cattle-raisers corn was widely available. Cattle now became the largest consumers of corn, driving up consumer prices (1992: 96).[112] This is a situation reminiscent of Europe in the eighteenth century, when people and stock were forced to compete for grain crops so that fattier cuts of beef could be sold to the upper classes. Nevertheless, the various collapses sent beef prices up, in turn drawing more ranchers west to exploit the situation further. This eventually led to the famous collapse of the 1930s (Steinberg 2002: 134). The loss of cattle on the Great Plains increased opportunities for crop farmers in the 1890s to access land. Now there were ecological pressures from intense land-use by ranchers and farmers. This led directly to the 1930s collapse. This collapse resulted in Roosevelt deciding to send federal money to aid farmers. What happened though was unexpected. Farmers continued to farm the Great Plains with the expectation that if there were another disaster the Federal government would bail them out each time. In effect the American taxpayer began to subsidize specialized crop farming. Without this intervention, farming on the Plains was unsustainable. So instead of turning to more sustainable practices, the land was subjected to an "economic culture that viewed the land as capital, a society in which the search for profits guided relations with the earth." What appeared to be "rugged individualism" on the part of farmers was in actuality a nationally shared risk program to protect markets. Specialization increases environmental stress and lessens a society's ability to adapt to environment change (2002: 135-7). The result, therefore, was to not to make fundamental changes, but to pursue practices like the intense fertilization of crops. This sort of analysis can be equally applied to cattle-raising practices. Cattle and grazing is a mutually dependent self-regulating process; overstocking and overgrazing are dependent upon an economic impulse rooted in a capitalist mode of accumulation.

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[112] Going on since the 1830s on the northern Plains, the deal between corn and cattle was formalised in 1876, and was done to satisfy the British market. So popular among the British was this corn-fed beef that British investment flooded into America (Rifkin 1992: 94). Corn also became the grain of choice as land prices and taxation made grass less profitable. The strategy now was to fatten cattle by buying older animals and quickly fattening them for slaughter (Cronon 1991: 222).

Spanish Fever

As a result of new rail connections, southern cattle-raising producers in Texas were able to ship their cattle to northern markets. Unfortunately, there was a drawback. Of all the breeds, Texas longhorns—a cross between the Spanish *criollo* originally brought from Spain and English longhorns—were the most adaptable and hardy breeds for the American Southwest, but were poor dinner meat. They were also infested with ticks carrying a disease called Spanish Fever to which they had developed near immunity (White 1991: 220-1). It was a common and accepted part of raising this breed. That was not the case in the north. There the Anglo-American system of cattle-raising dominated. The breeds tended to be less hardy because they were bred for the quality of their meat (Paul 1998: 192; White 1993: 221). In 1868, Texas markets crashed after northern cattle were sickened and killed by coming into contact with Texas Longhorns. Fear and hostility toward Texas cattle increased. Quarantines were imposed to sequester Texas cattle in feedlots until it was determined if the animals were safe to transport north for slaughter. This raised the price of production for a breed of cattle that was not that popular to begin with (Carlson 2001b: 93-95). By the 1880s fear of infestation caused meatpackers to ask the government to create a department of health inspectors with the power to ensure the quality and quarantine diseased cattle. Many ranchers complained that this was unnecessary governmental interference in the free trade of goods; nevertheless, a compromise Bill was passed in 1884 asking everyone involved to co-operate to ensure the health of the industry. That cooperation did not materialise, and it was only pressure from Europe that finally forced the American Government to impose quality and health standards. Still, by 1885, fear had driven Arizona, Colorado, Montana, Nebraska, New Mexico, and Wyoming to join Kansas in banning any cattle coming from Texas (2001b: 98-9).

Europeans grew suspicious about the lack of progress in developing a solution to diseased cattle. The result was declining sales, which then caused American meat prices to fall as well. By 1890, a federal certification programme was put in place to satisfy European consumers (Wade 1987). Simultaneously, cattle producers initiated a search for a cure and were joined in 1893 by the USDA's Bureau of Animal Industry. Ultimately, their work did little to find the cause of the fever, but the research had

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positive consequences for understanding other disease affecting people, like malaria, yellow fever, and encephalitis (Carlson 2001b: 99). However, little practical progress was made. Quarantines were still ineffective at that time and vaccinations were too expensive.

By 1906 the Department of Agriculture was involved in inspecting cattle in the south, and a program of "dipping" and "spraying" the animals began, even though mortality rates among the animals were high from the treatment. It was, nevertheless, one of the first attempts by the United States government to implement a federally funded program based on scientific data; unfortunately, an infestation of ticks was nearly impossible to eradicate and remained a problem well into the 1930s (2001b: 100-103). Eventually it was discovered that rotating the animals through a series of different pasture was the easiest way to disinfect a ranch. "Pasture rotation," which required enclosed spaces, was the only successful strategy for eradicating ticks in longhorns. The practice deepened the practice of feedlots (2001b: 94) and is an example of how production is impacted by nature.

Feedlots as a Strategy to increase Productivity

Feedlots of a sort were not uncommon throughout this period. It has often been necessary to hold the animals in a holding area for a very brief period prior to slaughter. The typical practice of cattle-raisers was to keep an animal on the land until they were five or six years old to get them big enough for slaughter and obtain the highest price. Feedlots became more prevalent when the price of land rose in the Mid-western States. It was also a means of fattening cattle on corn to suite the tastes of consumers, who they could then charge more. Corn was introduced into the cattle's diet expressly for this purpose as early as the 1830s, but the process used an inordinate amount of grain, so it was rejected as an ineffective cost-cutting measure in those early days. However, after the collapse of the range system, feedlots began to play a much more important role in the production process, because it was now becoming too expensive to keep cattle on the land in fenced spaces that could no longer provide enough forage year round (Steinberg 2002: 194). Livestock, fences, and attempts to control brush fires altered the west's natural ecology. Competition for space for feed led to the regular feeding corn to cattle, and was the precursor of today's feedlot system (Cronon 1991: 221-3). Feedlots, however, concentrate ecological degradation, especially pollution caused by manure that was no longer being used to revitalize depleted soils in other areas. A problem made worse by crop specialization.

Crises of the Environment throughout the Cattle Frontiers

In Europe before the enclosures cattle grazed on the commons. Too many cattle on too little land led to the problems of overgrazing and worn-out soils. To supplement these changes the French and English imported clover from Spain and turnips from the Netherlands (Carlson 2001b: 172). Cattle-raisers in the eastern United States tried similar strategies by importing grasses and other forage plants from Europe to seed their enclosed pastureland. In the end, however, stock-raising in the east could not compete with ranching in the west where free land and free grass were abundantly available (Rifkin 1992: 87).

Competition for these resources among cattle-raisers eventually led to the formation of Stock Grower's Associations in the 1870s. Co-operatives sprang-up throughout the region for the purpose of managing the land; however, they were ineffective in controlling the overgrazing and trampling of public lands as cattle were moved around on the region in search of water. It was not in the rancher's financial interest to protect public lands. Beef prices were peaking in 1882 and there was money to be made (Paul 1998: 201-2). The tendency, therefore, was for Stock Associations to mimic the interests of British investors (Rifkin 1992: 91), while ignoring Federal Land Laws that interfered with the cattle-raisers ability to be profitable. Neither could ranchers in the semi-arid regions of the Great Plains afford the amount of land necessary to raise cattle in a region where "it takes thirty acres to graze a cow" (Paul 1998: 200). The droughts of the 1880s and 1890s, though natural occurrences, were made worse by an irrational grid system that did not even take into account issues around water distribution and access (Steinberg 2002: 117). As has typically been the case, the economic relationship to the land was invariably governed by short-sighted utilitarian values.

The 'golden age' of cattle ranching in the west had ended by the mid-1850s because supply began to outstrip demand. American markets had become glutted by their successes while international export markets still remained limited to trade in by-products. To fight the tide of these events, cattle-raisers needed capital (and credit) to expand their operations in an effort to increase productivity and become more cost effective to survive fluctuations in market prices (Paul 1998: 150). As example, throughout the south-western States and California beef prices were high during the Gold Rush years of 1849 and 1850 as people flooded into those territories. Cattle-raisers in turn started a process of overstocking and overgrazing rangelands over the next decade in an effort to take advantage of these higher prices. This resulted in the mismanagement of the land's ecology. Their strategy for economic success was further complicated by droughts from 1858 to 1864 in different areas of the region (1998: 187).[113] Consequently, overproduction became a serious economic issue during this period. The opportunity for the cattle-raiser to benefit from higher cattle prices often was too hard to resist. Damage to the environment accumulated with each passing season because there is not enough time for the land to recover between socio-economic cycles. When demand was satisfied, prices collapse, leaving the land overstocked leading to increased competition among cattle-raisers. The more competitive and better financed operators were able to buy-out their neighbours thereby concentrating the wealth and power in fewer and fewer hands, while creating an insecure environment for wage labourers who were often subject to wage cuts and loss of work during market fluctuations (Wade 1987: 226).[114] This has since become a common economic-ecological cycle in the cattle industry.

Despite these efforts by ranchers, profitability was in a long slow decline after the 'golden age' of ranching. Many had taken on debts during that time that they could no longer pay when prices began to fall in the 1860s. Foreclosures were common, and those that survived the downturn did so by buying foreclosed land and stocking it with improved breeds. California's beef industry picked-up momentarily in the 1890s; but, by then it was too late. California cattle-raisers could no longer supply enough meat for even local consumption. Crop farming was displacing ranching, leaving the beef industry to develop on the Great Plains (Paul 1998: 188-9). Cattle-raising's decline was also due to its lack of access to the eastern markets. The more important point is that the collapse of cattle-raising in California meant that the least adapted region of North America in terms of precipitation—The Great Plains—would become the site of intense cattle-raising practices.

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[113] The drought was most severe from 1862 to 1864 resulting in a 40 percent die-off. Many Hispanic cattle-raisers in California could not pay their debts and were bought-out by larger capitalized operations moving in from the east (White 1991: 240-1).

[114] In the early 1880s wages ranged from $1.25 to $4.50 per day depending upon skill level and position (Wade 1987: 228), but not much is known because the lack the statistics for wages and working conditions prior to the 1880s is virtually non-existent, and though there were accidents and deaths, workers really only revolted when wages lagged behind rising costs leading to strikes in 1879, which resulted in the unionization of the stockyards. With roughly 75, 000 members by 1886 the work day was reduced to eight hour shifts, down from the fourteen to fifteen hour days previously (1987: 233). Other work pressures fell on local butchers and slaughterers who were pushed out of business by more powerful meat-packing companies more able to establish prices (Cronon 1991: 244).

Carrying Capacity of the Great Plains

Cattle-raisers deliberately changed the environment to suit their utilitarian ideals, and "improving" the land often meant reducing its biodiversity and subjecting it to the pressures of overgrazing. In fact the whole point of settling the land in the first place was to subdue it and get the *wildness* out of it. Approximately four million cattle were grazing the Great Plains in 1880, and their numbers were growing. By the mid-1880s their number was over 7.5 million, not including Texas or New Mexico. All concentrated in a semi-arid region that receives only 15 to 20 inches of precipitation per annum (White 1991: 185, 227). These lands are not well suited to the continuous pressures of market demands. So it was not long before the first signs of ecological disaster began to appear on the Southern Plains and then quickly spread to the north.

On the southern Plains in 1870, five acres would support one steer; in 1880 that same steer needed 50 acres just to survive. On the northern Plains the situation was much worse. In some areas it now took 90 acres to feed an animal (1991: 222-3). The problem continued well into the 1890s. Ranch lands that had once supported 150,000 cattle a decade before would now only support 30,000 (1991: 226). After the Civil War, when many veterans moved into the cattle areas to farm, cattle-raiser's access to free ranges was severely curtailed. In the drier climates of the southwest, when farmers broke the land they found their crop yields were too low to remain competitive in the marketplace, so they often abandoned the homestead and left the land to blow away. Cattle-raisers could not reclaim the land because grazing grasses did not grow back nearly as quick as did inedible weeds (Slatta 1990: 185-6). Consequently, access to forage became a problem after the 1887 disaster, and by 1900, ninety-five percent of all cattle were provided feed during the winter months. One strategy to minimize feed costs was to switch to the Hereford breed, which fattened quicker and therefore, required less feed before slaughter. It was also produced a better quality of meat that the consumer enjoyed (White 272-3).

Trampling and overstocking were also serious problems on the Great Plains. These led to the demise of indigenous grasses. For example, cheat grass was introduced from Europe in the 1890s as forage; however, it does not stay green long enough in the semi-arid western regions of North America to be a valuable fodder, yet it is now the most populous grass in the West (Steinberg 2002: 201). Tall grasses disappeared and were replaced by short grasses, as cattle over-ate them. Short grasses expose the land to more sunlight allowing weeds to grow in the open and trampled areas; thus transforming the landscape. A shortage of tall grasses and overstocking the land led to conflicts between ranchers and between farmers and ranchers (Cronon 1991: 220-1).[115] Jordan explains: overgrazing destroys perennial grasses, and promotes annual growths reducing the amount to eat. The practice of brush-burning to clear land promoted perennial growth, not annual, which led to less growth overall and higher rates of evaporation leading to desertification; while excessive grazing and trampling around riparian areas leads to the growth of brush, which in turn leads to habitat destruction and reduced access to water sources (Cronon 1991: 220; Jordan 1993:10-1). Free grass, high beef prices, and demanding investors pushed productivity beyond the carrying capacity of the land. Attempts were made to recover the land, by introducing different types of exotic grasses, relying less on the natural ecology to recover (White 1991: 226). There was recognition of the problem, but the solution was to maintain the *status quo* as much as possible.

After the 'big die-off' of 1887, open-range grazing ended, large profits ended, and the use of public land came into dispute. At the same time, the industry was increasingly gaining more access to local, regional, and global markets. The demand for beef, driven by consumer tastes, was becoming more dependent upon technological innovation, like refrigeration, to sustain it. The concentration of cattle on to the Great Plains, though ecologically unsound, was shaped by the structural contradictions between the environment and the political economy in an effort to produce the material wants of consumers in urbanised centres (Robbins 1994: 70-2). Technological and organizational solutions were being applied in such a way as to maintain productivity. By introducing new stages of production between sites of production and consumers the contradiction between production and nature was deepening as capitalist accumulation was prioritized ahead of the needs of the very environment that sustain those irrational practices. The pressures to overproduce repeatedly led to cycles of overstocking and overgrazing on the Great Plains and in the Great Basin. How could it be otherwise, since the British had been financing these huge cattle corporations precisely to take advantage of the free grass (Rifkin 1992: 89)? Investment ignored ecological facts that the region produced very little precipitation, making it easy to go beyond the carrying capacity of the land (Robbins 1994: 78-9). The dryness of the Great Plains meant that without irrigation (which even at the beginning of the twentieth century was still rudimentary) crop farming was still a hazardous proposition, so many settlers turned to ranching for their livelihood. This in turn led to the need to eliminate the buffalo and Indians because of the need for vast tracts of land to graze cattle (Cronon 1991: 214).

Native Peoples and Buffalo:

The average Anglo-American thought of the native peoples of North America as an inferior culture and race. One of main reasons for this antagonism was the inability of Anglo-Americans to incorporate their labour into the capitalist world-economy. It was these people Jefferson was referring to when he called the American continent the "unpeopled continent" (White 1991: 84). After the Mexican period and the annexation of the Mexican Territories,[116] American natives became next largest problem for the American Government in asserting control over the west. Unfortunately, it was not uncommon the government to mislead natives by making deals with them only to break

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[115] Today over 60 percent of all the foreign grasses and weeds in Canada's farmlands are of European origin and over 50 percent in the United States (Crosby 1986: 164; 1994: 40).

[116] After the annexations of the 1840s and 1850s and the growth of Anglo cattle trade in Texas, the American diet began a shift towards an emphasis on eating beef (Williams and Stout 1964).

them as expansion became more desirable. Though not formally acknowledged until 1871, the policy toward natives from the 1840s to the 1880s was one of assimilation or extinction, and under the Dawes General Allotment Acts first enacted in 1887 and lasting until 1934 the government attempted to turn natives into farmers (Davis *et al* 1972: 101). As they migrated west, Anglo-Americans would often destroy the crops of natives and cut-off their access to buffalo, the main source of food for many tribes. Natives retaliated by launching raids on the newly arrived migrant's livestock (Paul 1998: 133; White 1991: 90). The annexation of the American West had similar impacts on the natives as had the enclosures did on England' commoners. Natives were forced off their 'common' lands to allow beef the production of a commodity for the European market (Rifkin 1992: 108).

For the United States the most straightforward way to subdue the natives was to eliminate their food supply. Cattlemen, financiers, the United States army, and those hired by the railways all participated in the outright eradication of a species (Rifkin 1992: 73). As rail made the west more accessible and tanning techniques improved after 1870 buffalo leather became a very attractive product and the mass slaughter began (Cronon 1991: 216). Buffalo hunters were paid $1 to $3 per hide, which was mostly purchased by the British Army, while the meat was left to rot. In all, the American Government sanctioned the extermination of over 80,000,000 Buffalo (Rifkin 1992: 75; Williams and Stout 1964: 18). Despite the slaughter, buffalo herds were in trouble anyway. They were experiencing a severe loss of habitat and the introduction of 'hardier' plants by Anglo-Americans was replacing the more familiar indigenous fauna lessening their access to food. Moreover, the introduction of cattle onto the Great Plains spread foreign diseases like tuberculosis and brucellosis to buffalo herds that also threatened their survival (White 1991: 216-8). In a cruel twist of fate, natives who had been forced onto reservations by the 1880s for lack of food were now being supplied surplus beef by the Government to stave-off starvation (Rifkin 1992: 82-83). In the twentieth century, once cattle ranges were established rancher's attention formally turned their attention to predatory indigenous animals. To protect their investment in cattle and crops the Congress, on behalf of ranchers and farmers, moved in 1915 to begin a campaign against predators and rodents, like coyotes, wolves, bears, bobcats, Lynxes, and mountain lions (Steinberg 2002: 146).

There can be no doubt that the introduction of cattle has been a nexus of social change. The push west directly caused the elimination of bison and the removal of natives from the land only to be replaced by cattle. What species survived on the cattle frontiers of North America depended very much on their utility, but more than that their ability to attract a price (Cronon 1991: 266). The elimination of the buffalo and the subjugation of the native people is one of the clearest examples of incorporation and transformation of a landscape for the sake of profitable cattle production.

Fertilisers

Cattle-raisers generally did not use fertilisers themselves. However, they were heavily dependent upon them because without feed crops, especially corn, cattle-raising would be impossible in an era of the American enclosures and specialization. The introduction of chemical fertilisers in the 1840s in England during Europe's 'soil' crisis is probably the starkest demonstration of how the imperative to increase production acts to separate the natural cycles of agriculture from the economic need to increase productivity, giving us a clear example of *systemic cycles of agro-ecological transformation*. What is unique about this particular period is that the closure of the west meant that further broadening of the world-system was no longer an available strategy to the Americans—at least internally. In light of these restrictions, one alternative is to find technologically innovative ways to ease the pressures of reduced access to grazing lands.

In the 1820s and 1830s soil fertility was declining in Europe and they found themselves in need of a solution. Britain was reduced to importing bones starting in 1823 and continuing to 1837. Bones were then replaced by bird dung that was being imported from Chile starting in 1835. During this time a German chemist named Justus von Liebig discovered that nitrogen, phosphorous, and potassium were active nutrients in soil. His work so influenced landowner John Lawes of London; he went on to invent a phosphate based fertiliser in 1842 (Foster 2002: 156; Foster and Magdoff 2000: 43-4). Produced in England in 1843 by a company founded by Lawes, it did not reach America until after the American Civil War (Foster 2002: 156). By 1888, however, phosphate was being mined and manufactured into a usable fertilizer in Florida, and then sold to "richer" farmers in North America and Europe (McNeill 2000: 23). Until then, as cattle moved west into bison habitats, many were killed and their bones sold for phosphate fertiliser for use on the southern corn and cotton crops (Steinberg 2002: 128-9). Even so, by 1900, the biological processes within soil remained a scientific mystery, and it was not until the 1920s that chemicals (fertilisers and insecticides) began to be used in any quantity (Davis *et al* 1972: 391).

The success of these phosphate fertilisers was short lived, mainly because soil is only as good as the nutrient that has the least presence—Liebig's *Law of the Minimum*. Many other nutrients make up the fertility of the soil, but the one found to be the most deficient was nitrogen, though it was not introduced until 1913. The production and use of fertilizers continued because it ensured profitability, despite the well-known link between capitalism and agriculture. American economist Henry Carey wrote throughout the 1850s that the separation between town and country by long distance trade was having a direct impact on the depletion of soil (Foster 2002: 158; Foster and Magdoff 2000: 45-6). There is a link between fertilisers and rents. Fertilizers were used to artificially standardise dissimilar soils, but they also acted to hide soil exhaustion from the user, requiring the use of even more fertilizers to maintain productivity, while the landowner continued to collect the same rents. "Worn out" soils were still a problem, but once the industrial capacity of the United States was freed-up after WWII, nitrogen fertilisers came into heavy use deepening the problem of soil exhaustion. The implication for cattle has been that legume crops, such as legume clover and alfalfa hay, which can convert "atmospheric nitrogen" into a usable form by plants, were no longer grown for feed or to naturally reintroduce nitrogen to the soil; instead, the nitrogen cycle was broken, thus allowing farmers to specialize their wheat, corn, barley, and tomato crops without the need to rotate between crops and fallow (Foster and Magdoff 2000: 51-2). This is the essence of Foster's notion of metabolic rift. Fertilisers have been used to increase agricultural productivity, by breaking the nutrient cycle that allows for increased specialization at the expense of a deepening ecological crisis. A situation Carey recognised almost as soon as fertilizers were introduced.

Reform and Recovery: 1890s to 1916

After the big 'die-off' of 1886 and 1887 there was a changed political environment. The government stopped selling public lands in the west after it closed the open range in 1891. Ranchers lost the capacity to increase their grazing areas while the government continued to allow, almost unabated, meatpackers to carve-out monopolies until the end of this period in 1920. The power of the Cattle Barons, who once controlled the industry by grazing large numbers of cattle, had disappeared. Wealth was now accruing to the corporations that owned and operated the railways and the meatpacking houses. During this period, the industry's emphasis changed from owning and managing cattle-raising operations, where the risks of producing cattle was left to individual ranchers, to creating horizontal and vertical integrated corporations as a means of controlling prices and ensuring profitability. The emphasis was on creating business opportunities around the introduction of new technologies that were introduced to sustain the production process.

However, these meatpacking monopolies were beginning to meet with resistance. Martin Sklar in *The Corporate Reconstruction of American Capitalism, 1890-1916* emphases that attitudes to unregulated competitive capitalism were beginning to change after the mid-1890s. Unregulated competition was not creating any fairness in the market for labour throughout the industry because of the repeated cycles of overproduction, which were generating cycles of boom and bust that were intensifying with each passing cycle (1988: 53, 55, 59). The practice was destabilizing national trade and causing hardship for labour. Of course, a worldwide depression in the 1893 did not help, but the decade did mark "the beginning of a new phase in world capitalism" (Robbins 1994: 79) based on technological improvements. More than that, the widespread use and availability of these new technologies, especially refrigerated railcars and trans-Atlantic shipping was helping to regiment agricultural activity. The capacity to transport large volumes of beef and other agricultural commodities had improved dramatically. Fresh meat could now be shipped around the world safely in a matter of days (1994: 79-80). Other technologies were making their appearance and creating financial interest as well. Ranchers were shifting away from historical practices of land management and purchasing new types of feed that were being grown more economically with the introduction of irrigation (Paul 1998: 204; White 1991: 227). These transformations, however, were possible only by accelerating and drawing upon more and more natural inputs. That is, the mechanization of cattle-raising required it to use more resources than would otherwise be necessary, in an effort to achieve ever higher levels of productivity. The introduction of technology facilitated the transition from a proprietary-competitive form of capitalism to a corporate-administrative form of capitalism.

Governments wanted to regulate economic activity to ensure a level of fairness and stability for the public, labour, and businesses, which it in turn believed would guarantee America's success as a nation (Sklar 1988: 35). Arrighi affirms this view of transition, noting that from 1865 to 1914 the United States was undergoing a structural reorganization and turning to "bureaucratically managed corporations" that were vertically integrated (Arrighi 1994: 281).[117] Neither describes a specific example of this change, though I can think no other industry that was as vertically integrated as the cattle industry at that time given the diversity of the industry's inputs and outputs. The emphasis on vertical integration was a useful adaptive strategy for meatpacking companies and their investors.[118]

The way the government sought to control the meatpacking industry was through Anti-trust legislation (Sklar 1988: 33). Prior to WWI five meatpacking companies controlled two-thirds of the cattle production, giving them the capacity to manipulate prices at each stage of production, or, as Jeremy Rifkin claims in *Beyond Beef*, they were using their power to deliberately fix prices (Rifkin 1992: 115-6).[119] The problem facing the government of the day was how to go about reorganizing and breaking-up these monopolies without destroying the industry. Not surprisingly, many corporations, particularly the smaller ones, were keen to have intra-corporate dealings regulated while at the same time calling for the imposition of more competition between labour. In principle, the social policy position of President Theodore Roosevelt's administration

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117 International investment grew six-fold between 1870 and 1914, with at least half coming from Britain, and that mostly went to the West (McNeill 2003: 262), and even though by the 1920s the United State's economy accounted for 40 percent of the world's production it was still poorly integrated into the world-economy because it still lacked the necessary financial institutions (Arrighi and Silver 1999: 85). The United States remained a peripheral state within the interstate system, but was clearly in a phase of ascendancy.

118 The most effective way of "bringing the competition under control was vertical integration" (Arrighi and Silver 1999: 123). This is what happened more and more after the Great Depression of 1873 to 1896, and was developed most successfully in the United States (1999: 128-9).

119 In the same period the rise of 'trusts' or capital groups (vertically integrated business) began to emerge by 1900 and at that time fully 62 percent of agribusinesses was owned by seven trusts: notably US Steel Corp, J.P. Morgan E. H. Gary, J.D. Rockefeller among others (Beaud 1983).

was to reject this view as untenable because workers needed some protection as well. What emerged was corporate-liberalism where the state was supposed to police a system of fair trade and control certain sectors of it to ensure equal access (Sklar 1988: 33-36, 38-9). In practice, however, competition among corporate entities diminished as competition became more regulated, while competition among ranchers continued, forcing them to increase their productivity as they came under increasing pressure from the meatpacking corporations wanting reduce their own costs. Nevertheless, the political consensus at this historical juncture was that markets needed to be regulated to some degree to create a fairer society—*corporate liberalism* (1988: 181).[120] The years from 1896 to 1914 were a recovery period for the capitalist class, while the conditions and wages of the working classes remained largely unchanged (Arrighi 1994: 173). In the beef industry, beef production was reaching an all time high by 1917 and the meatpackers were benefiting greatly, while labour struggled under the same poor work conditions for low wages and cattle-raisers were striving to raise their levels of productivity to remain economically viable.

By the end of the nineteenth century the cattle industry was operating nationally. To stabilize profitability, investors and large corporations were no longer interested in owning or operating sites of cattle production. The withdrawal of capital from the cattle-raising sector of the industry, because of the loss of "free grass," was creating spaces and opportunities for the individual rancher to reassert him or herself. However, one of the main problems facing these independent ranchers was the cost of staying in business. Small independent ranchers had fewer cattle to cover their overhead costs. The inability of ranches to produce large numbers of cattle for market meant profits declined. Neither could independent ranchers benefit from cheaper transportation rates available to large corporate operations that could fill whole railcars with cattle. This is just one of the ways in which the system began to work against the producer (Williams and Stout 1964).[121]

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[120] Today's middle class, who would become the main consumer of North American beef, has its roots in this restructuring process (Sklar 1988: 22). This era was viewed by those involved as a new dispensation where there was equal opportunity, consumers were protected from fraudulent claims and business was protected from unfair competition (1988: 439)

[121] Toward the end of the ninetieth century, producers began banding together and organised marketing co-operatives to keep shipping costs down and establish fairer pricing methods for their product to counter the powerful meatpacking corporations. By 1917, these types of organisations were in operation at all terminal stockyards (Williams and Stout 1964).

By the end of this period, ranch operations were incurring higher operational costs while facing increased pressure from powerful meatpackers to sell their cattle for less money.

Two issues begin to take shape and are moulded by the controversies of this period that will become prominent after the 1920s. Both are the offspring of ongoing historical processes and both deeply impact cattle-raising practices and the beef industry as a whole. The first is the deepening mechanization of the range and the second is the conservation movement.

The industrialisation and expansion of the cattle frontier since the nineteenth century has significantly affected the American landscape. Large-scale deforestation and the introduction of large-scale irrigation projects for purposes of creating more pasturage and cropland that will only intensify over the course of the twentieth century (McNeill 2003: 264-5). The unintended loss of the open range prompted many ex-cowboys to strike out on their own as land and cattle became available after prices collapsed in the 1880s (White 1991: 345). These smaller operations required the use of more technological inputs to maintain productivity. By the 1890s hay rakes, mowing machines, windmills, fence mending, &etc had replaced the open-range ranching system all together (Slatta 1990: 187).[122] Mechanization was becoming necessary to stay competitive and stay in business.

Conservation movements in America are a direct response to the abuses of the land by cattle grazing, and to some degree farming. These are really only reconstituted versions of the debates about the ideologies of land distribution and how to manage the land and its resources. Conservation became a public matter after the 1890s through the efforts of environmental activist John Muir and others as a means of preventing further soil erosion, deforestation, and mineral depletion (Davis *et al* 1972: 114). A number of Acts were passed after the Homestead Act of 1862 to protect the land from overuse, but were for the most part unsuccessful. Muir's efforts, on the other hand, which began in the last decades of the nineteenth century resulted the American Government establishing conservation areas. The first was Yellowstone National Park in 1872 followed shortly by others. By 1897, there were a total of thirteen conservation sites encompassing thirteen million acres, and eventually led President Woodrow Wilson to sign the National Park Service Act in 1916 (Switzer 1998: 77-8). At the heart of these conservation efforts was the problem of grazing and how to manage it when the dryness of the western regions requires so much more land to support fewer cattle. Even after the establishment of public lands that closed access to forests for grazing only led to increased grazing pressures on grasslands; consequently, ranch associations formed to lobby state governments, which effectively took back control of public lands for grazing (Starrs 1998: 58-9). There has been a state of tension ever since between the government and cattle-raisers.

Summary

Despite the economic instability created by the intense inter-corporate competition leading to cycles of overproduction and the interrelated problems of recurring droughts, the United States was not on the verge of permanent ecological collapse. It was, however, struggling to maintain productivity in the face ecological limits, and it was the interaction between the two that set historical limits of transformation. What we see in the beef industry is a continuation of the need to expand the world-system because of intense land-use. This need to incorporate more land into the capitalist world-economy affirms Foster's notion of metabolic rift. Though implicit, it reflects too little of the impact of the socio-political realm. The desire of Anglo-Americans to reproduce a way of life (social, economic, political) inherited from the Europeans formalized eco-social relationships. The result was the continuation of intense land use and a disregard for the indigenous peoples. Social life was becoming increasingly dominated by the logic of the capitalist mode of accumulation. Cattle-raising, therefore, whatever its attraction as a way of life, is at its "core" an "economic pursuit" (Starrs 1998: 9). Cattle production and meatpacker control over production reached an historical peak in 1917 when there was increased demand for food for soldiers and factory workers (Williams and Stout 1964). The cattle and crop boom of 1915 to 1918 was short-lived, and was followed by another

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[122] This change was not sudden, rather it was gradual starting in the worst affected regions. For example, Alberta's cattle-raiser s would not be affected

series of cycles of overproduction throughout the 1920s (Davis *et al* 1972: 406), following a similar pattern established in the1850s. Higher beef prices brought more ranchers west to exploit the situation further. This cycle of overproduction eventually led to the collapse of the 1930s (Steinberg 2002: 134). Little recognised, the resurgence of cattle production from 1900 to 1920 was helped by better than average weather conditions with above average rainfalls on the prairie region of the west. Conditions worsened when another series of droughts followed from 1921 to 1925 (Gray 1968: 19; White 1991: 230). The social and ecological costs of commodification were becoming more apparent, while the fundamental cause of this contradiction between production for markets and ecological degradation continues to be ignored beyond seeking innovations that ensure market access.

As a practical matter, the survival of capitalist accumulation depends upon shifting as much as is possible the exploitation inherent in the system, including ecological degradation, to the periphery (Roberts and Grimes 1999: 74). This was clearly the case across the American west, where the cattle-raising industry, having access to free grass made unusually high profits that in turn encouraged investors to build rail for ranchers to have access markets (Steinberg 2002: 129). Cattle raised in the America, particularly in the west, are part of a growing and more deeply integrated system of long distant production—commodity chains—that was generating wealth for its British and east coast investors (the core) while the producing regions incur the social and environmental costs in the form of social conflict and degraded landscapes, which, as it turns out, was eventually recovered after the American taxpayer subsidized the ecological recovery, by paying ranchers not to re-stock the land and by paying for fertilizers in the 1930s. Specialization made possible by new technologies further tying food production to markets forces away further disconnects people from the natural cycles of their food sources. More importantly, these crises encourage the notion that all eco-social relations can be managed begins to dominate.

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until after the severe winter of 1906-7 (Slatta 1990: 189).

CHAPTER 5 MANAGING CRISES, 1920 TO 1973

> [When speaking of cattle grazing,] American farmers have exploited the soil like a mine and have forgotten to respect the demands of the grass. They have made it work like a slave: they have worn it out with work, neglecting the periods of rest it required. After the grass had died from overwork it was the soil itself that succumbed. Washed away by erosion in the rivers.
>
> André Voisin (1961: 28).

> The impact of countless hooves and mouths over the years has done more to alter the type of vegetation and land forms of the West than all the water projects, strip mines, power plants, freeways, and subdivision developments combined.
>
> Philip Fadkin, Audubon Society (qtd. in Rifkin 1992: 211).

The period of 1920 to 1973 is a continuation and deepening of the secular trends I have been describing so far: expansion, commodification, and mechanization will continue to deepen of the contradiction between society and nature, culminating in the complete industrialisation of agriculture after the 1940s. These trends always represent transformation that is contested. By 1920, agricultural practices were becoming more deeply tied to local financial institutions after the withdrawal of much larger investors. The opening-up of these social spaces gave ranchers the opportunity to form associations that would protect their interests. At the same time, ranchers and farmers were also becoming less self-reliant as their methods of production adjusted to the arrival of more complex, widely available technologies that would increase competition and productivity among ranchers, further driving a wedge between sustainable practices and the need to maintain economic viability. Smaller operations were now much more dependent on urban economies not only for places to sell their product, but also for financing revealing a deepening integration of urban-rural economies (Davis *et al* 1972: 400-1). Many tasks once done locally on the ranch or farm were now commodified practice.

Increasing differentiation in the production process had narrowed the role of cattle-raisers to only one stage of production. After the industry's collapse during the late

1880s, the transition to *corporate liberalism* was meant to change the dynamic between the cattle-raiser and meatpackers. The west, as a *commodity frontier*, continued to evolve undergoing a deepening of *industrialization* and a widening of market-access as a part of those core-periphery relations Moore calls the *frontier mode* (Moore 2000b).[123] That is, expansion continues, but does not actually require the political-military incorporation of other's territory. Rather, other polities are leveraged within the interstate system through trade agreements that favour the core. An analysis of the secular trends of the twentieth century reveals an essentially transitional period shifting from what was mainly a broadening phase in one region of the world-system, namely North America, to a period of deepening its own control over economic interests within its own territory. It was also expanding the industry throughout the capitalist world-economy by competing within the interstate system.[124] This is occurring through the *mechanization* of processes and the *standardization* of products—a form of Fordist production.

This period sees many social transformations around the commodification of cattle. It sees the introduction of more efficient transportation; the decentralisation and automation of meatpacking; the rise of commercial feedlots; continued abuse of the environment; irrigation; the rise of the middle class, marketing, and consumption; a shift from international trade in livestock and fresh meat to a focus on domestic markets;[125] and on the ranch there is increasing specialization and a shift to more 'useful' breed of cow all part of the a continually changing industry. Each change is a rational response to the historical problems of beef production governed by an ideology still ignorant of the direct connections between human practices and nature, or how to go about solving those problems without deepening the crisis. Potential sources of ecological crises do not just originate with the intense and direct use of fertilizers, pesticides, antibiotics, poor manuring practices, irrigation &etc, but also from the indirect use of fossil fuel technologies, used by profitable businesses like trucking. The introduction of these practices further narrows the available alternatives for changing direction within the world-system.

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[123] Moore describes a commodity frontier as spatial exploration of the environment that entails a description of the production processes in "one place," in my case, the cattle frontier in North America, while still aware of the fact that spatial expansion is not limited to that one place, but a part of the capitalist world-economy in general that he describes as a frontier mode--that broader "world-historical category" that essentially refers to the inherent need of the capitalist world-economy to expand (2003: 411-12, 427-8), so in the case of North America, the frontier mode was a necessary condition of capitalist expansion, that is, without the American frontier the expansion of the European capitalist world economy would have been impossible.

[124] Friedman's approach to this issue of expansion takes on a modal form when she writes that territorial expansion in the modern world is in the form of trans-national economies (Friedmann 2000) where control of resources and space is accomplished through a system of unequal exchange.

[125] Beef by-products, hides, margarine, and a host of other finished products, continue to circulate throughout the capitalist world-economy.

The United States and Core-Periphery Relations

As a general trend, Britain and America's roles as hegemonic powers were reversing within the interstate system. According to Michel Beaud in his book *A History of Capitalism* the reason for this reversal is the competing and "different forms" of capitalism adopted by each nation.[126] Britain was struggling to shore-up a system already in crisis by trying to regain its role as a financial centre and remain competitive in the industrial sectors, while the United States turned back to its agricultural roots that put business ahead of all other interests (Beaud 1983: 149-52). The cattle industry was a part of that shift. By the 1920s the cattle industry was one of the largest contributors to the GNP of the United States, and the second largest employer in the country (Rifkin 1992: 114). The United States was able to grow its economy and out-produce an unstable Europe from 1914 to 1945 because of its geographic isolation and its access to resources (Arrighi 1994: 276). After WWI, the United States became the world's newest hegemonic power, which reached its peak between 1945 and 1967. A position they have since been struggling to maintain (Hopkins and Wallerstein 1982: 62; Wallerstein 1979: 31).[127] Others disregard this dating and see the present as a continuation resulting in the emergence of the United States as empire (Laxer 2002, September 24). Whatever the outcome of that debate, 1950 to 1973 was the most profitable period in the history of the capitalist world-economy and within the interstate system the United States benefited the most (Arrighi 1994: 298). Within the beef industry the data shows that shipments of fresh beef to Britain declined. Instead, the focus was on developing its own internal markets to satisfy its own internal demands. Interstate activity in livestock really had little impact on the American livestock market at this time (Williams and Stout 1964:

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[126] Competing and "different forms" implies fundamental differences. I do not think this was Beaud's point. What he talks about is how each nation emphases different capitalist strategies to guide their recoveries.

[127] They describe American hegemony as beginning in 1897 after the Great Depression. They became a hegemonic power after 1920, reaching maturity during 1945 to 1967 period. This was followed by a period of hegemonic decline that continues today (Hopkins and Wallerstein 1982: 118).

729). The United States was still by far the biggest producer, but because of a growing population it crossed back and forth between being a net exporter until the war time period to a net importer during the mid-1950s as demand surges, and again a marginal exporter in the very early 1960s. The principal exporters in the interstate system were Denmark, New Zealand, Argentina, and Australia followed by other minor exporters like France, the Netherlands, Ireland, Brazil, and Uruguay, and while Britain and the United States accounted for eighty-five percent of the world's import market in 1960. However, the United States was still only importing less than four percent of its total domestic beef market (1964: 734-6). The changes in the global trade were significant. The United States shifts from being one of the world's largest exporters of beef during the nineteenth and early twentieth centuries to a marginal net importer by mid-century, despite being by far the world's largest producer. Therefore, the national focus turned to growing and exploiting its own internal markets to meet its national demands.

After WWII, therefore, the policy of the United States was to engage in a strategy of economic-agricultural imperialism. Though trade in cattle between Mexico, the Caribbean, and South America goes back long before the Second World War to the nineteenth century, it was only after the war that the United States aggressively tried to involve itself in expanding cattle-raising in those areas to meet its own needs. In the 1950s, meatpackers were looking for sources of cheap disease-free meat for the North American consumer. By the 1960s, cattle were Central and South America's third largest export commodity to the United States (Tucker 2000: 322). This Green Revolution, as it became known, began in the 1940s and was really the beginning of industrial agriculture (Steinberg 2002: 271). It was the industrialization of agriculture based on the notion that technologies like irrigation and fertilisers would solve the problems of agriculture encountered in earlier decades. Part of that development came at the prompting of Britain and America who 'encouraged' the investment of billions of dollars in loans from the World Bank and the Inter-American Development Bank to cut down rain forests for pastureland (Rifkin 1992: 147). The demand for beef in America led first to the clearing of Central American forest for pasturage in the 1950s (McNeill 2000: 321), which facilitated the opening of thirty new meatpacking plants in the region. That was followed shortly by the sale of fertilisers to these countries; all of which greatly benefited the

American economy (Steinberg 2002: 272). By the 1960s, the rainforests of South America were being cleared to create even more pastureland. It was a form of "ecological imperialism," where beef production "becomes determined by markets" (Friedmann 2000:485).[128] This is evidence for Moore's notion of the frontier mode in practice. The United States was trying to incorporate, through economic means, the Central and South American periphery.

Trade with Britain declined because the United States' production levels of fresh meat could now only satisfy national needs. Typically throughout this period beef consumption is moving towards a balance between consumption and production (Williams and Stout 1964: 96). This is a reactionary period, focused on the management of crises using available advances in technology. The focus was on productivity, and not on understanding and harnessing the inherent limits of the land to find sustainable practices until forced to do so by changing circumstance. So, while the government and the public were becoming much more reflective about the role of meatpackers. Large meatpacking corporations continued to pursue a wide range of business opportunities that would allow them to concentrate more control over production in their hands. This did not include an interest in the actual raising of cattle, that practice would be left to independent cattle-raisers to take the risks of cattle-raising. On the other side of that equation, cattle-raisers were forming cooperative organisations as a countervailing force to the powers of the meatpackers with the power to negotiate pricing.

Unfortunately, there were other forces affecting this process. By 1918 there was a glut of beef on the American market and prices began to fall plunging to half of what they were in 1918 by 1922. There was some improvement after 1925, but the recovery could not be sustained and prices fell again by sixty-six percent between 1928 and 1931 (White 1991: 464). The lowest prices of the century occurred in 1933 during the Great Depression, and were commensurate with a sustained drop in production from 1930 to 1941, which would not recover until the outbreak of hostilities in WWII (Williams and Stout 1964: 570). The reoccurring problem was repeated cycles of overproduction throughout the American economy in 1920s and 1930s—including the beef industry—

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[128] The critical problem here is that rainforests, and forests in general are necessary for regulating the earth's temperatures (Friedmann 2000).

that would not right itself until the Government intervened in the economy during and after WWII, and get corporate America back on its feet (Arrighi and Silver 1999: 136-7; White 1991: 469). Cattle markets had long seen susceptible to cycles of overproduction, because a price fluctuation in one year, due to say disease, or some other pressure, often causes to prices rise when demand outstrips supply. This leads to overstocking and more supply; but that normally does not show up until several years later, when the prices collapse again because of overproduction (Davis *et al* 1972: 406). These cycles were exaggerated by drought and economic depression. By the Great Depression, the government intervened in the mid-1930s to stop the decline. That resulted in a price recovery between 1938 and 1942, which it then froze until 1945 at war's end.

After the war inflation and yet another drought in west during the early 1950s saw declining returns throughout the industry. Things turned around in the late 1950s and remained buoyant until the worldwide crisis of the late 1960s and early 1970s. Land prices continued to increase after WWII, despite the fluctuations in beef prices during the 1950s and early 1960s. Rangeland prices usually fall when prices do; however, after WWII, capital in the west was being invested in real estate development (Gray 1968: 20). Seventy to eighty percent of a rancher's capital was now tied-up in land investments. Moreover, labour was harder to find as better jobs in other sectors of the economy and other areas of the beef the industry became available. The way to keep costs down was by increasing productivity. Therefore, the decades after the war can be characterized by high levels of production on much larger ranches, rising costs requiring huge investments, increased debt, loss of access to pools of labour, and loss of political clout as the Livestock Associations declined in influence. Return on investment during the 1950s and 1960s was extremely low because of increasing costs, especially land as individual ranchers scrambled for pastureland that could carry enough livestock to make money, and the reality was that most ranches were run using credit (1968: 19-20).

The other contributing factor was the growing population of the United States. From 1947 to 1960, the population of the United States increased by thirty-six million, or by more than two percent annually. Real incomes rose annually by five percent and annual beef consumption was rising slightly faster than population grow. Yet, the number of ranches dropped by one-third between 1940 and 1960, while the number of animals per farm increased, as did productivity. The distribution of cattle was changing slightly as well. Cattle numbers were declining in the North West and the North Central regions; numbers remained virtually unchanged in the Southwest, and increased in the West and Mountain regions (Williams and Stout 1964: 427-9). White's account of it, blames rising costs and taxes and the evolution of agriculture into a highly specialized business, requiring financing, was major negative impacts on cattle-raising by the 1970s (White 1991: 520-5). In sum, several factors appear to account for this change: continued overproduction, rising costs of land, population pressures, access to land for grazing, taxes, and water. A rancher's survival after the mid-1950s required capital to operate and investments in irrigation, hybrid grasses, hormones and medication. Other pressures also included a re-emergence of 'sodbusting,' that is, the return of crop farmers, across the west after the 1920s and increasing specialization throughout the industry in ecologically vulnerable regions. Forage crops that could have been grown in the lush eastern States, were being grown on expensive irrigated lands in the semi-arid west.

Breaking up Monopolies

The main reason for this periodization comes in recognising the decline of influence of meatpackers from the Consent Decree of 1920 to a low period of corporate control in the 1970s. Meatpackers were forced by the government to break-up their monopolies and agree to some degree of regulation to maintain market stability, and prevent the deepening cycles of boom and bust from affecting the nation's economy. In relation to other industries, meatpacking was not a highly regulated industry; therefore, it was constantly subject to antitrust lawsuits because of its dubious trading practices (Williams and Stout 1964: 431). The influence of the top five meatpackers—Armour, Swift, Morris, Wilson, and Cudahy—peaked in 1917 during WWI. By then, they controlled fifty-five percent of the national market. The top firms experienced an overall decline in market influence, and by 1970, they influenced only twenty-one percent of market share (Schlosser 2002: 137). That decline was due to Government intervention over monopolistic behaviour by the biggest meatpackers, in part prompted by the "exceptionally" high prices being charged for their products (Williams and Stout 1964: 184). By 1920, many of the meatpackers were both extensively horizontally and vertically integrated. They owned many processing plants and different plants dealing with by-products—horizontal integration. They also owned feed, feedlots, concentration yards, transportation facilitates, and distribution facilities—vertical integration.

To deal with this situation, just prior to WWI, the Federal Trade Commission directed by President Woodrow Wilson began an investigation of the industry for the violation of antitrust laws using the Sherman Antitrust Act of 1890. After years of wrangling, the 'big five' were finally threatened with court action if they would not agree to sign the Consent Decree of 1920. Under it, they all agreed to sell-off many of their major assets. The whole procedure resulted in the nationalization of some railways, the sale of the nation's principal stockyards, all of their refrigerator cars, and many of their strategically located warehouses (1964: 184, 631-2). The signing of the Decree ushered in a period twenty year period during which cattle-raisers, for the first time in beef producing history, were able to successfully organise and protect their interests with some success (1964: 204).[129] Cattle-raisers began to organize their own stockyard operations that were located in the rural areas closer to their ranch operation. This led to the decline of terminal meatpacking plants and stockyards in the cities. To remain relevant, they would re-emerge in rural towns co-located with commercial feedlots and ranchers. However, once the meatpacking industry restructured and reorganize their businesses around these changes, they were once again in a position, after the crises of the 1970s, to dominate the industry.

Meatpackers were always opposed to any cooperative livestock and shipping associations. Various attempts in the Midwest were made prior to the 1920s, some were quite productive between 1906 and 1910 in Chicago, Kansas City and St. Joseph, but were opposed by meatpackers refusing access and membership to any of those co-operatives trying to penetrate the market system. The most successful of any livestock association was the Farmer's Union at Omaha in 1917 that by 1922 was operating in Chicago, Kansas, Sioux City, Denver, and St. Paul (Williams and Stout 1964: 187). Meatpackers resisted these groups, and like all transformations, there were gains and losses. By 1935, corporate meatpackers temporarily rebounded, surpassing their previous levels of market control, reaching sixty-one percent of the market share (Rifkin 1992: 146). It was short-lived; however, once the government intervened and "fixed" prices in 1938. Cattle-raisers pushed back, and focused their efforts on shipping cooperatives. While they managed to last until the 1960s, these cooperatives and associations would dissolve because many were poorly managed, which would lead to poor participation and eventual disinterest. Another important reason was that they were initially formed to deal with railway companies and not with trucking companies (Williams and Stout 1964: 181-5). The problem of dealing with transport monopolies became a much more diffuse problem that was much harder to manage with the introduction of trucking, since any number of individuals could start and operate a trucking company.

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[129] Shortly, after the Consent Decree (1920), the Federal government formed the Packer and Stockyard Administration to prevent any future price fixing (Schlosser 2002: 137). From this came the National Live Stock Producers Association of 1921, which opened over the next few years throughout the Midwest Another one of the successes of the Packers and Stockyards Act (1921) that helped producers claim losses in transport. Cattle moved through a 'marketing channel' from the producer via some form of transport to a local marketer, and only with the consent and co-operation of the co-operative associations would the cattle then move to a terminal slaughterer/packer before going to wholesalers and retailers (Williams and Stout 1964: 188-9). A year later, the Capper-Volstead Act of 1922 was enacted to give power to Ranch and Stock Co-operatives to ensure the fair treatment of cattle-raisers when it came to pricing; however, almost as soon as they began interest waned and their influence began to decline. There was a rapid period of growth nationally from 1916 to 1922 when the co-ops had reached 2284 from only 110 in 1910, but then began a steady decline in coop association right up until WWII when they were reduced to 926 (1964: 183-4).

Secular Trends: Expansion, Commodification, and Mechanization

The decentralization of the meatpackers occurred because of the cost efficiency benefits made available through the development of trucking and the building of a road system and the re-appearance of auctions, which were re-established by cattle-raisers trying to secure a bargaining position for their own interests. There were also pressures from the consumer for an affordable product. By lowering costs the industry could satisfy the consumer while maintaining profitability; however, that was not necessarily in the best interests of the cattle-raiser.

Auctions began to re-emerge in the 1920s and 1930s, along side livestock and shipping associations, as meatpackers began buying their cattle directly from the producer (MacLachlan 2001: 107; Williams and Stout 1964: 232-4). The popularity of these auctions began during the depression during the large-scale sell-off of farms and farm equipment. Eventually, though, they started handling livestock, resulting in their exponential growth from 1937 to 1949. By 1955, auctions were handling sixty percent of the nation's cattle. Seventy-four percent of which was bought directly from the cattle-raiser, which was in turn bought by the meatpackers (Williams and Stout 1964: 235, 250). By 1962, these non-terminal marketplaces represented about two-thirds of the movement of cattle to the meatpacker. This reorganization of the industry was the major reason for the decline of terminal stockyards in the major cities (1964: 192-3), and after more than a hundred years, the last stockyard at Chicago closed in 1971 (Schlosser 2002: 157). It could no longer compete with the movement of meatpackers into small towns in the West.

This transition would not have been possible without the advent of trucking, which was really the only technological advance of significant value prior to WWII. Seeing its value, the American Government began a series of public programs to build better roads. By 1921, one million trucks were plying surfaced and improved roads across the country (Davis *et al* 1972: 533ff.). This development had an unintentional consequence for meatpackers. It allowed them to co-locate their operations in the country closer to cattle-raisers, making possible the 'direct-to-packer' marketing of cattle that would increasingly become the norm (Cronon 1991: 375). The lower cost of trucking was increasing competition among the meatpackers (Williams and Stout 1964: 339). Before trucking, ninety percent of the transportation to public stockyards was handled by railway. The use of rail transport declined steadily after trucks and paved roads gained prominence in the 1920s (MacLachlan 2001: 105). It allowed meatpackers to restructure their organizations, and by 1959, eighty-five percent of all livestock was transported at some point by truck, while there was a steady and absolute decline in rail use (Williams and Stout 1964: 314-6). Correspondingly, there was a steady rise in transportation use by meatpackers for shipping (Williams and Stout 1964: 319). Better transportation allowed the industry to reorganize to lower its costs. Better transportation also allowed for the construction of supermarkets and local grocery stores, deepening the commodification of beef as consumerism began to emerge.

The disassembly line of Chicago's meatpacking plant became the model for industry; Ford merely perfected the process (Beaud 1983: 157). There were numerous technological changes inside the slaughterhouse after the 1940s: hide-pullers, mechanical stunners, power saws, conveyors of all types, de-hairing machine, improved curing processes, mechanized bolt stunners, air-powered knives, electronic slices and weigh scales, and quick freezing (MacLachlan 2001: 172; Williams and Stout 1964: 429). The introduction of these technologies did not occur all at once, and most were introduced after WWII. This was reflected in changes in productivity; from 1890 to 1954 productivity only increased at around 0.5 percent per year on average, but when one looks at the productivity rates after the war we find productivity increased twenty-four percent between 1947 and 1954, and yet another fifteen percent from 1954 to 1958 (MacLachlan, 2001: 171-2). The most significant development after that occurred in the 1960s, when IBP began pre-packaging and shipping pre-cut boxes of meat to cut their labour and transportation costs. It was the beginning of the end of the butcher's trade (Rifkin 1992: 126). On the ranch, different technologies were having a similar effect on productivity. Hay loaders, hay stackers, jeeps, and bulldozers lowered costs by reducing the need for labour, but at the same time increased the need for more capital to finance these operations (White 1991: 520). This process of *mechanization* increased productivity by compartmentalizing work consistent with the principles of scientific management, that is, Taylorism.

Automation took-off in the 1950s and 1960s within the meatpacking industry; yet, working conditions had changed little since Upton Sinclair's *The Jungle* (1906). Speaking of the 1980s and beyond, Rifkin writes that the conditions are still "hazardous and unsanitary." There was high employee turnover, which benefits the meatpacker. High turnover allows migrant and immigrant workers to compete for jobs, giving meatpackers the opportunity to pay lower wages (Rifkin 1992: 127). The industry has always relied on marginal groups to work in the plants. In the 1800s it was the Irish followed by the Germans. By 1911 it was Eastern Europeans, and by 1942 meatpacking was the first industry to hire a majority of blacks at Chicago (MacLachlan 2001: 221). Today, meatpackers hire mostly Southeast Asians, migrant workers, and illegal aliens, marginalized social groups that attract little public scrutiny, so long as it does not directly impact them.

Trucking gave meatpackers the opportunity to begin a process of moving out of the major cities into rural smaller urban centres. Away from inefficient terminal stockyards and slaughterers, and away from the public where the ecological impacts were not regulated to the same degree, as they would have been in the cities, like the earlier experience in Chicago around health issues. The effect of increasing the number of stages in the production process has the effect of deepening the commodification process—in affect lengthening the commodity chain, even though the spatial distances between meatpackers and ranchers were decreasing. It is the distances between the stages of production that increases environmental exploitation, making it much more difficult to hold the industry accountable for environmental degradation. This was made possible when the industry began to organize itself around trucking. The decentralisation process ensured a deepening of the commodification of beef. Meatpackers were then able to take advantage of cheaper labour in rural parts of North America. It also enabled increased specialization through mechanization. This separation of the stages of production increases environmental inputs and outputs, which can be externalized more easily because they are not so obvious. The increased use of fossil fuels would be an example. The pressure to restructure was in part due to the rising costs of land and labour in more developed areas. The goal was to find ways to lower costs. That challenge was met in part by the introduction of large commercial feedlots that were more suitable for use in the wide-open spaces of the west. Commercial feedlots would be a continuation of the trends of expansion, commodification, and mechanization, but in a changed form. It was the rise of another strategy to increase productivity and profitability by striving for more efficiency and the standardisation of the beef product. For the diversified cattle-raiser it was the beginning of reduced margins as they were forced to accept lower prices for a less uniform product (Williams and Stout 1964: 203-4, 215). This was the beginning of the standardization process in beef cuts, marbling and taste. The production of cattle was now more than ever before linked to the demands of consumers and markets. This was presenting cattle-raisers with productivity challenges that were beyond their control. This transformation would lead a deepening of corporatisation and industrialisation of the cattle-raising and agricultural industries in the capitalist world-economy.

Commercial Feedlots

Feedlots in their modern form did not exist in the 1940s (Starrs 1998: 121). They became important after WWII as industrial agricultural practices took hold with increased mechanization, 'improved' feed and fertilisation techniques for animals, and medical improvements in antibiotics (Davis *et al* 1972: 393).[130] The movement of cattle into the Midwest region for slaughter was a common practice long established, especially after the introduction of rail and terminal meatpackers like Chicago. Therefore, it would not be unusual to see commercial feedlots[131] emerge predominately on the Great Plains and in the Midwestern States bordering the Plains as cattle make their way to market through the terminal meatpacking plants that came to the fore in the nineteenth century. It was also the nation's grain growing region that would later produce specialized, genetically-enhanced sorghum grains specifically for fattening cattle that could "tolerate the closely spaced plantings found on irrigated farms (Steinberg 2002: 195). The complete antithesis to the climatic conditions found in the region. In other words, the feed was being produced and engineered to grow in artificially produced conditions requiring more environmental inputs.[132] Under these artificial circumstances, the co-locating of grain crops with commercial feedlots only made sense, so by the 1950s commercial feedlots were concentrating in the Midwest and southern Alberta to use up surplus grain that was no longer welcome in Europe (Kneen 2002: 44).[133] Under priced surplus grain, especially corn, and other by-products encouraged investment because feedlot practices made cattle production more profitable than it had been.

The other essential element in the rise in commercial feedlots was the ease with which they could be bought and operated by large meatpackers as a means of holding down prices (Huntsinger 2002: 79-80). No longer did the meatpacker have to deal with dozens, perhaps hundreds, of independent cattle-raisers each looking for the best price. Large commercial feedlot operators holding thousands of cattle could buy or sell whenever they could get the best price. In effect ensuring the demise of the co-operative auctions, which coincidently peaked in the 1950s (MacLachlan 2001: 107)[134] for lack of interest by individual ranchers who neither had the inclination or the desire to become market savvy.[135] Commercial feedlots were capital and environmental intense operations, and the rise in environmental inputs and outputs is directly related to meatpackers to increase productivity. The environmental impact has been severe, because feedlot practices interfere with the sustainable relationship between grazing and cattle by concentrating too many animals in too small a place. Moreover, because the animals are not range-fed their feed is full of nitrogen eaten from their feed, which negatively affects the planet's nitrogen cycle (Nierenberg 2001: 31). Excess nitrogen from and animal waste and fertilisers kill aquatic life, poison water sources, and unbalances soil chemistry.

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[130] Improved food would have included corn, soybeans, fishmeal, vitamin, hormones, and antibiotics all of use "massive amounts of water and energy" (Steinberg 2002: 190); way beyond the grasses that are natural diet of cattle.

[131] Commercial feedlot is defined "as a major enterprise involving capital investment in lots and other facilities where livestock are fed regularly or continuously for profit" (Williams and Stout 1964: 286). Feedlots were enjoying some popularity in the Midwest during the late nineteenth century (Steinberg 2002: 194); however, until the industrialization of the Green Revolution their full potential could not be realized.

[132] Even though grass-fed cattle are arguably healthier and animals and provide a more nutritional cut of meat for human beings. Andre Voison has done extensive work in this area, and has found a direct correlation between soil health, animal health, and human health in his books *Soil, Grass, and Cancer* (1959) and *Grass Productivity* (1961). His most fundamental premise is that our food is only as healthy as the soil that sustains it. Unfortunately, grass-fed cattle have less marbling than grain fed animals and not as attractive to the consumer (MacLachlan 2001: 53).

[133] Eventually, feedlots would appear in the South-western States in the late 1950s as the final step to slaughter, and it was this standardization that helped to close the gap between the higher quality 'fed' cattle of the North and the seasonally range-fed and different breed of animal in the south.

Though feedlots were common throughout the Corn-belt region, commercial feedlots began in earnest in California after WWII. Mainly as a practice to standardise cattle to meet the demands of local retailers, who wanted choice cuts of meat for a growing and more affluent middleclass in an era of consumerism.[136] Feedlots began a process of fundamental structural change in the relationship between the producer and the meatpacker. There was no longer any need for producers and meatpackers to deal with each other directly (Williams and Stout 1964: 287, 308-10). Commercial feedlots would replace auctions and terminal stockyards because they are at once places of production and a marketplace. Cattle-raisers can sell their cattle to a commercial feedlot operator who in turn sells direct to the meatpackers. Through commercial feedlots meatpackers attempted to standardize the size and taste of cattle to produce beef as a mass produced commodity.[137] They also gave the industry the opportunity to further integrate the production process, and create more prospects to create vertically integrated companies within the industry. The trend back to vertically integrated production began to reappear after the 1960s; up until then, small and medium meatpackers competed regionally with large horizontally integrated packers (MacLachlan 2001: 165). From 1956 to 1962 meatpackers were actively investing in commercial feedlot operations and feed production, once again raising concerns about the concentration of power in their hands. At that time, several large food retailers were more involved in operating feedlots than the meatpackers. Nationally this participation was still small, though in some locations the concentration ownership was enough in to affect the competition (Williams and Stout 1964: 308).

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[134] The last public stockyards (auctions), the Ontario Stock Yards of Canada, closed in Toronto in 1994. Canadian meatpackers remained small in comparison to the meatpackers in the United States, and remained an essentially domestic industry until the 1990s. Edmonton's first packing plant was opened in 1908 by Swift Canada (MacLachlan 2001: 107, 150-3).

[135] While this period represents many gains for the producer, many would not be taken advantage of because of lack of knowledge about how the system worked. Often prices were better at terminal meatpackers, but transportation was inconvenient for most. One study in the North Central region showed the tendency of humans to routinize their behaviour and fully 80 percent of those producers dealt with one market exclusively and failed to see how inter market competition was effecting their prices. Moreover, producers were more likely to pay more attention to buying rather than selling their livestock because of the complicated process it involved (Williams and Stout 1964: 198-202). Familiarity and habit were the deciding factors for most.

[136] Two events drive the growth for the beef industry in the post-WWII era: the introduction of fast food vendors, namely the opening of McDonalds in 1955 and the introduction of the home freezer. Red meat production had increased 150 percent between 1909 and 1958 due to population pressures and improved per capita income of a middle class wanting fresh meat (Williams and Stout 1964: 340). This trend grew exponentially with the invention of the home freezer that went from zero in 1945 to twelve million units in 1960 (1964: 394). This trend would also be impacted by other consumer habits such as women moving into the workforce, continued population growth, and frozen food product for restaurants (1964: 400). To expand markets in the 1920s corporate America starting an era of consumerism where people were targeted and their behaviours shaped to meet the needs of the product through advertising. It was also a time when built-in obsolescence was seen as a necessary practice to sustain demand for a product (Arrighi and Silver 1999: 135). Clearly, that practice did not affect beef directly, since people always need to buy more beef (one of the attractions of commodifying food products), but it did impact all aspects of production. Instead, the drive was to get people to eat more beef, and from the 1890s to 1969 Marion Nestle tells us in her book Food Politics that the government promoted increased consumption to overcome malnutrition (Nestle 2002: 31-8), with beef

Commercial feedlots began as places where cattle could be fattened with corn to get that 'marbled' beef that consumers enjoyed. Later, that would lead to more consistent quality meat and better cuts (Steinberg 2002: 195).[138] Feedlots were a major shift to year round feeding. In 1962, two thirds of cattle slaughtered came from feedlots holding fewer than a thousand head of cattle. By 1973, the situation was reversed, and two thirds of cattle were coming from feedlots handling over a thousand head, with twenty percent of that number coming from feedlots handling over thirty-two thousand head (MacLennan and Walker 1980: 32). Feedlots, at the time, were run by independent operators who would normally buy their animals directly from the cattle-raiser, the

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consumption peaking in the mid-1970s. The idea that there is a distinction between consumption as choice and production as imposition is difficult to assess, but advertising tips the balance in favour of production (Friedmann 1995: 26-29).

[137] Fordism had a more social and environmental impact form 1912 to 1945 in the United States because the production process requires greater environmental inputs and outputs in the form of waste and pollution (McNeill 2000: 317).

[138] Another essential, and often overlooked, technological change—MacLachlan calls it most significant technological change in the production process in his book Kill and Chill: Restructuring Canada's Beef Commodity Chain (2001: 51))—was the progress made in cattle breeding. Until the 1920s, pedigree was the standard as opposed to which particular breed was more suitable as a commodity. Scientific breeding has been creating a breed of cattle that it standardized in every respect (MacLachlan 2001: 43; Rifkin 1992: 148).

animals were held for a period of time, and then sold directly to the meatpacker for slaughter bypassing other markets (Williams and Stout 1964: 281, 287). In these early days of commercial feedlots they were concentrated in the Midwest close to grain producers as corn became the favoured grain because it favourably changed the taste of meat but more importantly its use as feed provided a market for overproduced grains the United States that they could not sell on world markets. Locating in the Midwest also meant lower transportation costs. All of which has an ironic twist in that these practices increased productivity despite the Great Plains being the region of North America least able to meet the required productivity levels if using more traditional and sustainable cattle-raising methods.

Chemical Addictions

Concurrent with this movement to commercial feedlots was a similar rise in antibiotic and growth hormone use in the early 1950s to maintain the health of the cattle (McNeill 2000: 202; Steinberg 2002: 195-6). Heavy use of growth hormones, however, especially bovine growth hormones (rBGH) used to boost milk production, would not begin until the 1980s (Carlson 2001b: 150).

Likewise, the intensification of feedlot practices disrupt the natural nitrogen cycle; when there is too much nitrogen in the system it acts as a poison. Nowadays, less than half of the manure produced by cattle is cycled back into the natural system, the rest is subsequently dumped into the water system. The nitrogen in the manure is responsible for dead-zones in rivers. For example, at the mouth of the Mississippi an area the size of New Jersey has become a dead zone in part because of the impact of the nitrogen coming from manure. Once in the river, it produces toxic micro-organisms that de-oxygenates the water and kills the fish (Nierenberg 2001). Not only does industrialised agriculture break the nutrient cycle, it give the false impression to the public and even to those working in the agricultural sector that nitrogen fertilizers can be used to replace clover and hay as forage without any consequences (Steinberg 2002: 195). Synthetic fertilisers, mostly developed after WWII, further compound the problem.

To ensure profitability at each stage of production, the solution of choice for dealing with the breaking the historical and natural nitrogen cycle between cattle and crops was to create an artificial feed product. This is a clear example of how change in the cattle industry is conditioned by the need to sustain highly profitable practices, like feedlots. Unfortunately, as Foster points out, most economists "treat the economy as if it were suspended in space, [and] not as a subsystem within a larger biosphere" (Foster 2002: 36), as if the two are independent of one another. In actuality, creating sustainable practices that fit the "logic" of capitalism fail because it requires valuing nature as a set of costs based on its exchange-value in the market. This is problematic. First, it is doubtful that it is even possible for *all* costs to be internalized within a "profit-making system."[139] The second is whether costing the environment would actually make a difference to the health of the environment in the face of a system that must inherently expand, but is constrained by the limits of planet (2002: 37). Since the domestication of cattle is a human activity, so it takes time to find a balance between grazing and sustainability. In nature the relationship between grazing and grazers evolves and is balanced over long periods of time. Cattle-raising as a social practice is not a 'natural' relationship and always results in what Jordan calls "specialized grazing" in that, social relations, and more specifically, the social relations surrounding the production of commodities determine grazing patterns (Jordan 1993: 10). The conflict between sustainable practices and economically convenient practices is time. Nature can replenish itself given time, while social relations based on capitalist economic relationships tend to suppress and compress time.

Public Policy

Public land policy in the United States is a continuation of the ideal of the yeoman farmer (Hill 2003: 8). The selling of public land under the Homestead Acts did not officially end until President Franklin Roosevelt signed the Taylor Grazing Act of 1934. In doing so, he put an end to the privatization of land, leaving 170 million acres of land in hands of the Federal Government.[140] The first attempts to end the sale of public land came in 1891 when the Forest Reserve Act was enacted to protect future timber supplies

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[139] Joseph Schumpeter—"capitalism is a process, stationary capitalism would be a contradiction in *adjecto*" (qtd. in Foster 2002: 74).

[140] Today the Government holds over 650 million acres (Switzer 1998:72). Land is being withheld by the government from private ownership in an effort to conserve the land and not subject to commercial pressures. How successful this program is remains an open question.

(Switzer 1998: 71), but the success this and other Acts is variable. Ranchers were generally supportive of the conservation movement until the Federal Government directed the Forest Service to introduce grazing fees in 1906. The reaction of ranchers was immediate and violent. Though fees were quite small, for the rancher access to grazing land could mean the difference between economic ruin or economic survival (White 1991: 408). Fees only narrowed the profit margin for the rancher. Conservation for the rancher has always been based on the "most profitable combination" of practices that allow for the continuation of his or her ranch (Gray 1968: 383). However, once the Dust Bowl of the 1930s struck, in large part because of the mismanagement of the land due to overgrazing and mono-cropping, ranchers were glad for the Government's assistance.

During that time, the Government paid ranchers to reduce the number of cattle on the Great Plains. They also enacted the Taylor Grazing Act of 1934 so the government could always be in a position to manage stock grazing on public lands (Switzer 1998: 72; White 1991: 479). The Act set-up grazing zones that gave preference to ranchers who owned land and that had a home on it. One study done at the time by the United States General Accounting Office found that cattle had endangered and wiped-out more plant species than any other single factor and were a serious threat to riparian areas when ranchers allowed cattle to overuse water resources, which in doing so also caused the dislocation and loss of habitat for numerous birds and animals (Switzer 1998: 71-3). President Theodore Roosevelt (1901-09) believed that public ownership of land was the best way to ensure that it was managed properly through a system of government departments and fee schedules (White 1991: 400-1). The Grazing Act was one such attempt. It remained in effect until 1964, after which, the Bureau of Land Management, which was established in 1945, took-over the management of public lands (Davis *et al* 1972: 115; Starrs 1998: 59-60).[141]

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[141] The Taylor Act of 1934 was followed shortly by the Domestic Allotment Act of 1938, which came under the Soil Erosion Service, which itself was just established in the 1930s, for the first time placed agricultural production under the legal eyes of soil conservation standards (Davis *et al* 1972: 115).

After the dust bowl of the 1930s and the rise of conservationism in the public's consciousness,[142] the government became more aggressive in dealing with the problems of western overgrazing. They began enforcing conservation laws on public lands and demanded better management of the land by ranchers and farmers (Starrs 1998: 57-60). American ranchers and farmers then resorted to using the right to private property as means to avoid implementing government regulations. They argued they were protected under the Fifth Amendment of the United States Constitution, which states that private property cannot be used for public use without compensating the owners (Switzer 1998: 82ff). Needless to say, this has always been a very contentious issue in the United States, which is why the government has such difficulty in exercising control of the land for the common good, the endangered Species Act and the later Clean Water Act just to name two. Arguments also arisen over legal jurisdiction. What Jefferson intended to liberate—the yeoman class—has become an albatross around the neck of the government preventing sustainable practices. In this sense, capitalism has successfully capitalized on the notion of 'private property' by naturalizing the concept, that is, the notion of private property has become accepted as a given, and the only way to organize human interests is through that ideal, whether or not it has any utility on the ground.

As a Result the Environment Suffers

The lack of water became the main environmental issue of this period. While other environmental issues such as overgrazing[143] and deforestation[144] at least have the pretence of being manageable issues, water was different. To manage the intensity of cattle-raising practices, ranchers needed access to large supplies of water, and here the contrast between limited resources and the drive in to increase productivity is much

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142 Part of this conscience raising came out a growth in tourism after 1900, when the West became a tourist attraction (Paul 1998: 295). This would have also put pressure on the government to manage the west's resources because of the economic benefits to the region.

143 Artificial reseeding started in the 1920s and was the main method for improving the grazing conditions of the land well into the 1950s (Gray 1968: 422), though after WWII there was a dramatic increase in synthetic nitrogen fertilizers that resulted in higher yields (Davis *et al* 1972: 267) that would become an important development in providing enough feed for cattle-raisers without have to seriously manage the number of animals on the land.

144 Before 1860, ninety percent of the deforestation was done to expand either cropland or pastureland. after that timber for rail ties represent about twenty-five percent of the demand for clearing by 1900. As the world-system expanded after the opening of the west, forests began to return in the East as farms were abandoned after being driven out of business by those in the west. Fortunately, forest areas stabilized after about 1920 (McNeill 2000: 229-32).

starker—water is available or it is not. Ignorance about the conditions and the adaptability of the land to farming and grazing pressures between 1830 and 1910 was a common theme (Davis *et al* 1972: 376). Fortunately, by the 1930s the relationship between soil, deforestation, and water conservation was becoming more apparent (1972: 115), but too late to avoid the Dust Bowl of the 1930s; although, that did not stop the continued tilling of the soil, which simply blew away without moisture (McNeill 2000: 43). The easiest solution that would not require a fundamental change in agricultural practices was to deepen the processes of industrialisation and apply more chemicals to 'kick-start' the land into producing once again (Friedmann 2000:493).[145] Between 1929 and 1934 the United States experienced an economic depression and its worst drought to date. As a result, cattle prices plummeted between 1928 and 1934 by some sixty percent. Many ranchers could not even recover their costs from the sale of their cattle, so many ranchers left their cattle to graze longer on the land in the hope prices would recover. This decision would lead ranchers to overgraze their own land, and force them to move on to public lands as they sought more forage for their cattle. It was this ecological mismanagement that led to the Taylor Act of 1934 (Schmitz, Furtan, and Baylis 2002: 347). It was an important step because by 1950s over half of all the land area in the United States was being used for grazing cattle and most of that land was located in the West (Williams and Stout 1964). To combat this degradation the Government began a series of conservation efforts in the 1940s, and by the 1950s landowners were encouraged to plant trees and build man-made ponds. Apparently, according to Davis, these efforts were beginning to have some restorative effect; however, in the 1960s new ecological problems appeared as the industry concentrated its operations in smaller rural urban areas causing more water and air pollution (Davis *et al* 1972: 115-6). As is common in the capitalist world-economy, the problems of ecological degradation seem to shift from one locale to another and in one form to another, while the underlying logic of accumulation remains unchanged or unchallenged.[146]

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[145] Embedded in this act is a belief that scientific innovation will solve the issues of the day. In my view the scientific community in its present institutional from has become a crutch for inaction, but also a tool for sustaining capitalist relations of production. Presently, there is an uneasy and suspicious relationship between science and business interests that goes beyond the scope of this paper, but that we need to be mindful of in how we understand social change. Food companies exert a disproportionate influence on governments that are not balanced with the rights of individuals to accurate and truthful information (Nestle 2003: 95-6). Of interest may be Sheldon Rampton and John Staubers's book *Trust us, we're Experts!: How Industry Manipulates Science and Gambles with your Future* (2001) for a critical and intriguing journalistic investigation and evaluation of this relationship.

Cattle were responsible for beginning the process of desertification[147] in the American West. A process deepened by recurring droughts. At the beginning of the twentieth century, the land partly recovered when the Great Plains experienced an abundance of rainfall. When the rains failed in the 1930s the predictable outcomes of overstocking and overgrazing re-emerged, and by 1936 the Great Plains could barely support cattle. Remarkably, in that same year the invention of the centrifugal pump made irrigation a reality (de Villiers 1999: 183-5). Irrigation has since become a key tool for dealing with the semi-arid conditions of the American West, and a way to manage riparian areas. This was not always possible until rudimentary technology to tap aquifers was developed in the early 1930s. When it arrived, it was a godsend for farmers and ranchers facing economic ruin during the Dust Bowl. The Ogallala aquifer, which is estimated to be about the size of Lake Huron, was being drained ten times faster than it could replenish itself by the 1970s, and according to John McNeill, at that rate the supply will last less than a century (McNeill 2000: 154). However, since then its use has accelerated, and the Ogallala, which lies underneath the Great Plains and is not evenly distributed or as readily accessible for some users in some areas as it is for others in other locales, is expected to reach crisis levels by 2020. Whenever that date arrives is speculation. What is not speculation is that at some time in the not too distant future it will simply run out or the water that is left will become inaccessible (de Villiers 1999: 187-8; Rothfeder 2001: 166). It will lead to crisis; yet neither *Economics of the Livestock-Meat Industry* (1964) by Williams and Stout nor *Ranch Economics* (1968) by Gray, who are writers during this period, even mention issues around water use or grapple with issues of water use, perhaps foreshadowing the next unintended crisis of the agricultural sector, which includes the beef industry. Yet, without water, the demands of food production in the United States cannot be met.[148] Arguably, because water use is tied to the economic well being of the people who using it in agriculture, people will resist changes to their practices. Industry continues will to seek ways to continue these practices with the least amount of interruption. Turning "to the markets" to 'fix' the problems of the soil by producing more potent fertilizers (Friedmann 2000: 493) is a case in point. It is yet another demonstration that solutions presented as the next best solution are of a particular social form that must ensure the survivability of the beef industry as a profitable endeavour.

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[146] An example supporting this type of conclusion can be found in a Merrill and Miller study done in 1961, which Gray mentions in *Ranch Economics* almost in passing. It found that the relationship between sustainable grazing practices and capitalist relations was well known. It found that pastures in Texas show that the dollar return per acre declines the more intensely the land is grazed. The study concluded that a moderate fifty percent utilisation rate is the best balance (1968: 415).

[147] Desertification had four aspects involving cattle: the overgrazing of the land, soil erosion, deforestation, poor water use practices. All of which add to the problems of global warming (Rifkin 1992: 200). Unknown to many, the 'dust bowl' of the 1970s was worse than that of the 1930s in that the 1970s experienced more soil erosion (Kroese 2002: 94). Cattle make that situation worse by destroying riparian zones, which have suffered form overgrazing and continues to this day (Rifkin 1992: 205). Droughts have been a major factor in the desertification process. There have been major

Crisis in the 1970s

The financial crisis of 1968 to 1973 was a reaction to the intense competitive pressures between governments and businesses. Interest in "Eurocurrency market" and changes in the gold standard led to a "withdrawal of capital from trade and production." The resulted in increased subsidization of agriculture and led to re-investment in the economy and the expansion of the 1970s and 1980s (Arrighi 1994: 299ff.). The cattle industry was part of this expansion. A food crisis in the USSR, led to grain deals in

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Droughts in 1860-1864; 1880-1886; 1894-1895; 1929-1936; 1944-1957; 1963-1965, for which relief federal programs rather than State programs have given feed loans, technical assistance, and implemented purchase programs (the buying animals to create markets) (Gray 1968: 401).

[148] It is also leading to a major conundrum. Here Indur Goklany makes an interesting observation about the state of the contemporary situation over water. He notes that if the irrigation levels were held at the 1961 levels, the amount of extra croplands needed to sustain the populations of today would be unsustainable. That is, without irrigation the current area of cropland is insufficient of meet food demands, since one acre of irrigated land is equivalent to three acres (2003: 111-2). These figures are sourced from the FAO in 2001 and are global estimates; nevertheless, what is interesting is the Malthusian predicament Goklany is presenting us. It raises questions about Marx's criticism of Malthus and the widespread notion that supply is not the problem, but distribution. Neo-Malthusians think that in the 1980s and 1990s the world's ecologies have reached a "critical turning point" was becoming increasingly apparent after the 1970s (Dyson 1996: 11, 16). Environmental issues are now unavoidably complicating the smooth-running of the capitalist world-economy, and the truth, as Dyson points out is always somewhere in the middle—yes there is a crisis in the world's food supply, but neo-Malthusian principles are in his demonstrably wrong in that some other path is always possible and can be chosen (1996: 201). However, Dyson's analysis makes this claim based on projections to 2020, in which case it may still hold that Marx is correct in criticizing Malthus for his lack of historical analysis and content, while Malthus still may be correct in that even if social history is taken into account there may eventually be some point at which there will simply be too many people for the planet to support them. In the meantime, Dyson's like many others, is predicated on the assumption (or faith) that scientific and technological innovation will continue to put-off into the future the social problems of today. In my view there must be a reckoning point.

1972-3 that changed the organisation of the food complex (Friedmann 1994: 258-9).[149] Since then, the livestock industry in the United States shifted from an essentially regional commodity frontier into a trans-nationally based industry, what Moore would describe as a frontier mode within the capitalist world-economy. After the dollar crisis of 1971 the Nixon administration began encouraging agricultural growth, but that growth was stalled by the oil crisis of 1973, raising operating costs for ranchers as energy costs rose. Continued high levels of meat consumption in the United States and Europe led to a restructuring in the world-system. A livestock-complex emerged where livestock and feed were produced regionally were now also produced around the world –soybeans grown in south America can be bought as feed, and after the crisis in the 1970s Multinational Corporations, like Cargill, have linked crops and cattle globally (Friedmann 1994: 267-272). The North American market was significantly changed. In the late 1970s, high interest rates meant higher beef prices, higher operating costs, and higher land values, while beef consumption was falling.[150] By the 1980s, cattle-ranching was in serious decline in North America, and was further complicated by the emergence of environmentalists (White 1991: 558-60).

Summary

One of the ironies of increasing productivity through mechanization is that it requires increased inputs, not less, and they are not always obvious. Each additional step in the production process deepens the commodification process. The introduction of rail in the nineteenth century and trucking in the twentieth are good examples of this; so are the introduction of tractors, fertilizers, pesticides, antibiotics, etc.[151] Specialization within the beef industry, mainly due to the mechanization of production, is a means to increase productivity levels and therefore profits. This is directly related to increased environmental inputs and detrimental outputs (like pollution and waste). The result is a continual fracturing of the relationship between the short-term goals of human activity governed by a capitalist ideology and the longer, historical rhythms of nature. A situation often made worse when innovations (technological or otherwise) are implemented or used to solve one crisis at one stage of production has an unintended consequence elsewhere in the production process that brings the system back into crisis. The reason for this is systemic in that whatever solution is introduced, it must first and foremost sustain patterns of accumulation, and it only becomes necessary to attend to the environment if it interferes with that process. Otherwise, it is generally ignored, and often hidden when the environmental degradation occurs in another part of the world-system for where the product is consumed. In this case, the American west, and eventually Central and South America act as the periphery and are being degraded to meet consumer demands for meat and the by-products of cattle production in the eastern states and Europe.

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[149] Cargill saw dramatic increases in their fortunes in the post war decades through subsidization. As Europe and Japan recovered from the war grain from the United States became less welcome, so the United States government under pressure from agricultural lobbyists passed a Public Law (PL) 480 known as The Agricultural Trade Development and Assistance Act (known publicly as the program 'Food for Peace') in July 1954 as means of creating a subsidized markets for American grain resulting in 400% increase in grain exports from 1955 to 1965 (Kneen 2002: 35-6).

[150] Nestle discusses at length the reason for this change in eating habits in *Food Politics* (2003).

[151] A tactic that from the 1980s and onward have not resulted in increased yields (Friedmann 2000).

The most notable change though was the introduction of the commercial feedlot in the 1950s and the events leading up to it. The meatpacking industry had seen a reversal of sorts after the government forced them to sign the Consent Decree in 1920. While their influence was in decline overall until the crisis of the 1970s, they re-emerge briefly during the dust bowl of the 1930s until the government fixed meat prices in 1938 to aid the recovery of cattle-raisers. During this same period, cattle-raisers were trying to challenge the meatpacker by organizing collectives to ensure they would get better prices from the meatpackers for their cattle. They were successful for a while, until commercial feedlots were bought and operated by meatpackers after the 1950s. Commercial feedlots became a way for the meatpacking industry to standardize the finished product and to influence pricing by maintaining a captive supply, putting pressure on the cattle-raiser to meet those standards of production or lose market access. So while the market share that meatpackers influenced was at a low at the end of this period, it was positioning itself to retake a position of dominance within the industry, by co-locating with and buying feedlot operations. Commercial feedlots changed the cattle-raiser and meatpacker dynamic in favour of the meatpacker.

CHAPTER 6 NORTH AMERICAN CATTLE INDUSTRY SINCE THE 1970S

> Far from being free of problems, I believe that much of the western range is in worse shape than even some of the most alarming assessments would have us believe.
>
> David Dagget (1998: 1).

> Capitalism, in order to become so dominant, had to convince people, against all the weight of tradition, that greed was really a virtue.
>
> Donald Worster (1993: 14).

The beef industry continues to be a major economic force in the North American economy.[152] Meatpackers continue to dominate, and since the mid-1970s have been engaged in the operational consolidation of the industry. This was seen as necessary because of the increased competition among the major meatpackers was making it difficult to maintain profitability while still giving the consumer the lowest price (Field 2002: 187). This was made more complicated in an era of declining beef consumption in North America because of changing attitudes toward consuming saturated fats.[153] Consolidation has resulted in the integration of the different stages of production under single corporate umbrellas. One strategy for doing this was to vertically and horizontally expands their control over the as much of the production process as possible. Today, meatpackers are more deeply involved in more stages of production than ever before: meatpacking and processing, commercial feedlots, feed production, pesticide and herbicide production for forage crops, ownership of range and farm land,[154] the production and mining of chemicals for fertilisers, the marketing and production of brand names products, transportation, and not least their financial dealings are all part of a successful vertically and horizontally integrated corporation. For example, fertilizers used on feed crops must be mined, processed, and eventually sold to the farmer, who applies the chemicals using machines designed for that purpose, which themselves are another commodity chain unto itself. However, not all stages of production are commodified, or else the capitalist could not create the conditions for extracting surpluses and create profit margins. Labour and land are simply counted as costs to the production process. By not commodifying 'inputs' the capitalist can maintain systemic patterns of accumulation (Wallerstein 1983: 16-7). By this process, a complex web of commodity chains is created that sustain and deepen the accumulation process, especially for those corporate "gatekeepers" that control access to the market.

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[152] In Alberta, at the tip of Northern Plains, for example, beef production is the largest agricultural sector worth an estimated $3.8 billion that represents 51 percent of all the farm production income for the Province and meatpacking is the second largest industry. Of Alberta's beef production: thirteen percent sold within Alberta, fifteen percent goes to Quebec, thirty-one percent goes to other provinces, thirty-two percent goes to the United States, and another nine percent goes to other countries (Stats Can 2003).

[153] Beef consumption in Canada peaked in 1976 at about 50 kilograms per person up from 32 kilograms in 1960 and was closely tied to increases in income in the post war decades. Between 1975 and 1994 beef consumption fell 23 percent from 83 pounds down to 64 pounds in the United States, while pork rose 28 percent and chicken 88 percent (Clark 2000: 239-40). The decline after the mid-1970s is closed related to health concerns over eating too much red meat and the availability of poultry after the rationing of WWII. The rise in poultry consumption is almost inverse relation to the decline of beef. Beef consumption reached a low in 1993 going back down to 1960 levels. The trend has been fairly stable since, but is now threatened by BSE scandals concerning animal feed (MacLachlan 2001: 311-5). Marion Nestle argues in *Food Politics* that food has become a highly politicized commodity providing large profit margins, and that since WWII 'food guidelines' have been established and changed to suit special interests. Meat producers, for example, have resisted the reduced portion sizes that do not reflect traditional consumption levels (2002: 33-6). And because food is an industry, food producers compete to repackage and invent foods because the suppliers are overproducing (2002: 13). In 1998 11,037 new food products were introduced of those 940 were new dairy products and 728 were processed meats, and each was developed for one purpose of attracting sales (2002: 25). And it is in this sense that Friedmann argues that capitalism "has undermined the traditional integrity of agriculture and local diets everywhere" (1994: 274).

The main players in this process are the companies Cargill, ConAgra, and IBP. Each of them operate out of the United States, but work toward controlling and profiting throughout the global agricultural industry. They act globally through government endorsed trade agreements that allow them to freely move capital across political borders. Also working in their favour is the restrictions pertaining to the movement of labour. Through binding trade agreements (like WTO, and perhaps a future Free Trade Area of the Americas), these corporations operate virtually unregulated in peripheral areas like South America.[155] According to Bunker and Ciccantell, NAFTA represents an early attempt by the Americans to make agreements that ensure a supply of raw materials and provide a measure of national security (Bunker and Ciccantell 1999: 116). These types of agreements, however, continue to marginalize the rights and conditions of labour (which directly affect the ecology) and all but ignore the ecological conditions beyond those situations that have an immediate impact on productivity. Today, the industry in Canada and the United States is a highly integrated system of production.

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[154] Forty-eight percent of all the agricultural land in the United States is rented by the producer. This is also a factor in the short-term ecological management of the land because rented land encourages specialization with all the inputs and waste that form of production entails (Foster and Magdoff 2002: 53). This is part of the process of the proletarianization of ranchers and farmers because they are loosing, or have lost, control over the production process (Lewontin 2002: 97). Moreover, when land is no longer productive for cattle-raising the large corporations that own the land sell it to developers, which means less land for grazing (Weeks 2002: 223).

[155] These practices reinforce a system of unequal exchange. The trends seen in the current world-system support Wallerstein's view that the desire to accumulate leads to the formation of monopolies and increased competition in the struggle to dislodge other monopolies, observing that the core is highly monopolized while the periphery remains highly competitive. This system needs state legitimation because "Markets are inherently anti-monopolistic," therefore need the nation-state to ensure their ability to accumulate (Wallerstein 1983: 142). The dilemma for the state is that it must find ways to support capitalist accumulation while protecting and maintaining the allegiance of their populations who are subject to its inherent contradictions (1983: 148). These practices have been the historical basis of power within the capitalist world-economy, and Friedman claims are no longer working in the

Historically, Canada has followed trends first established in the United States, even in eastern Canada, which remained an underdeveloped "dumping ground" for American beef until the twentieth century. Additionally, and perhaps surprisingly to some, the Canadian west has no cattle tradition of its own. It is entirely an extension of the Texas system that expanded across the Great Plains to the its' very northern tip known in Canada as the Palliser Triangle (Jordan 1993: 232). Furthermore, Canada has historically regulated its own industry by closely following American policies and regulation, and was usually carried-out in direct response to them. Canadian meatpackers, however, remained under Canadian ownership until the 1990s, when the American companies bought Canada's 'big three' (Canada Packers, Burns, and Swift Canadian), which had been in operation since the 1920s. In the Canadian west Cargill and IBP are now the dominant players and exert the same levels of market influence in Canada as they do in America (MacLachlan 2001: 185, 326-330).[156] This follows the historical pattern of attempting to streamline the industry by reducing competition within the industry.

Attempts to restructure and reorganize some practices are limited by physical constraints. There have been few changes during this period in cattle-raising practices or on the disassembly-line in meatpacking plants. This leaves few chances for cost cutting in the modern meatpacking plant—there are limits to the methods and rate at which animals can be processed. Meatpacking, therefore, continues to be a labour intense industry, mainly because cattle, despite the efforts of breeders, are still not uniform in size, marbling, or taste, preventing the transition from mechanization to full automation (MacLachlan 2001: 247). Human meat-cutters are still necessary. Quite naturally, the

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Americans favour since the former USSR's grain crisis in the 1970s changed the "livestock complex" and allowed companies like Cargill to link feed crops and cattle-raising globally (Friedmann 1994: 268ff.).

[156] IBP owns Lakeside Packers in Brooks, Alberta, and was their first foreign purchase in 1994 (MacLachlan 2001: 264).

industry has sought other ways increase efficiency standards. IBP cut costs and increased profits by introducing on-site pre-packing of meat (Stanley 1994: 130-4). This has led to increased specialization of the workforce within the meatpacking plant and the demise of the butchering trade in the retail industry. Another change has been the physical relocation of meatpacking and away from marketplaces and transportation routes and co-locate them with sites of feed production. This change is the opposite of the trend in the previous time period. We see this "new" trend occurring especially in Kansas and Nebraska—the corn-belt States—where forty percent of the feed production for the entire North American beef industry is produced (MacLachlan 2001: 55).

Another method for increasing cost efficiency is to further externalize labour costs whenever and wherever possible. The public continues to subsidize industrial pollution and the industry's poor treatment of labour. Currently, there are few enticements for companies to change dangerous work conditions or raise the pay of labour, even though these conditions put stresses on public health systems and social services, which help to compensate for their lack of financial resources. Their poor treatment, though a structural necessity within a capitalist system, also puts downward pressures on labour throughout the economy and is a strategy for companies connected to the beef industry to externalize their costs to the greater society. In Canada the work conditions are similar, and turnover is high (MacLachlan 2001). The American public have the additional costs of caring for and processing illegal aliens coming from Mexico who are used by meatpackers to reduce costs. There is little incentive for change since the penalties to companies employing these kinds of workers appear to be non-existent, while the cost to American society is enormous—these workers cannot be refused medical treatment, access to schooling, or legal aid.

On the ecological front the industry persists in using practices that increase the use of environmental inputs (especially around the feed sector) and create waste that cannot be re-absorbed by the production process. This is a systemic problem in great part due to the compartmentalization of each stage of the production process. When production is compartmentalized there is little chance of holding an umbrella corporation legally accountable for the environmental problems it creates. This results in piecemeal attempts to fine local companies without seriously addressing the structural contradictions facing the industry. Commercial feedlot practices are such a practice that negatively affects the whole ecosystem, including human and animal health. In effect the more industrialized the industry's practices become the higher are the public and environmental costs.

Feedlots, Meatpackers, and Captive Supplies

The use of feedlots has intensified since their commercial debut in the 1950s. By the late 1990s, more than a third of the cattle consumed in the United States come through one of just seventy feedlot operations (Foster and Magdoff 2000: 53). A remarkable concentration considering the millions of animals slaughtered every year for market. Cattle are corralled into small spaces for about four months while they are fattened for no other reason than to increase profitability. These practices are now also the biggest threat to the environment. The concentration of too many animals in too small a space is a serious contributor to water pollution (Price 2003, May/June: 36). Commercial feedlots in the current economic environment have become an essential strategy for meatpackers to efficiently process large numbers of cattle at reduced costs. When a meatpacker owns a feedlot operation their 'fixed' costs can be spread over a large numbers of cattle over the whole year (MacLachlan 2001: 60). The larger the feedlot operation, the lower the costs per head and the greater the profit margin per cow. The difference between a 1000 head feedlot and a 20,000 feedlot can be hundreds of dollars per head (Duncan *et al* 1997: 11). Predictably, this has encouraged the institution of 'mega' feedlots where some feedlots now have capacities exceeding 100,000 head in the United States and over 50,000 in Alberta (MacLachlan 2001: 63).[157] The trend for both feedlot and ranch operations is to grow larger by putting more animals in less space (Price 2003: 35). For feedlot operators that has meant a decline in the number of operation, however, it has the effect of forcing feedlot operators to be more competitive than ever in cutting costs (Duncan *et al* 1997: 12). The economic pressure to concentrate the industry is powerful and necessary from a business point of view. That is perhaps why President Ronald Reagan allowed meatpackers to merge in the 1980s without the threat of antitrust suites.[158] By the early 1990s, eighty-four percent of the beef processing industry was controlled by just four companies: Excel (Cargill), ConAgra, IBP, and National Beef (Schlosser 2002: 137). This dwarfs the levels of concentration seen during the 1920s when the government of the time forced meatpackers to sign the Consent Decree to avoid prosecution and to protect cattle-raisers and other labour from their exclusionary practices.

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[157] In Canada, Cor Van Raay Farms owns the largest feedlot operation in Canada just a few hours south of Calgary. He uses 600,000 tons of grain annually to feed his stock. Additionally, he owns 4500 hectares of land where manure is spread and where some of the 600,000 tons of grain, namely barley, that are used annually are grown to feed the animals (Gracia and Guthierrez 1999).

Feed

Co-locating meatpacking plants with feedlots has now become the global model for livestock production, resulting in more and more food crops being replaced by feed crops (McMichael 1994: 10-14; Rifkin 1992: 163). The great irony of deepening the commodification process is that where cattle were once able to graze grass we now grow feed crops using massive amount of chemicals. Moreover, these different stages of production within these commodity chains are often owned by the same corporation—Cargill being a prime example (Kneen 2002: 41). The result of these practices is that cattle and human beings now have to compete for the same food sources (Friedmann 1994: 273). This is not a natural state of affairs, but an induced state to ensure the profitability of vertically integrated agribusinesses that have a variety of economic interests throughout the world's food economy, all of which need to be profitable.[159] In other words, by feeding cattle grains they are ensuring a market for the grain they produce.

Cattle are not physically suited to eating grains rather than grasses.[160] The grain portion of feed is now made up of some variety of grains, corn, corn silage, barley, and barley silage and sorghum. This is quite different from early commercial feedlots that used 'agricultural by-products' such as beet tops—a practice abandoned because the quality and taste of the final product was less predictable (Carlson 2001b: 268; MacLachlan 2001: 67). Corn is not a natural food for cattle, and about eight percent of cattle go to slaughter with liver abscesses from eating food they have not evolved to eat. To put what is happening in perspective, industrialised beef production now feeds twice as much grain to cattle than is available for the entire United States population. The main reason for this change is that between 1945 and 1970 grain production in the United States grew a whopping 240 percent, all of which needed a market. The switch to corn feed was also in part due to the knowledge that consumers preferred the taste of beef raised on corn, a practice dating back to the 1830s. The result was that by 1989 about 50 percent of cattle were 'finished' (in the commercial feedlot) on corn (Rifkin 1992: 98). Typically a farmer in the corn-belt might have rotated corn, soybeans, clovers, alfalfa, and other grains to support livestock. These diversified practices helped to maintain the integrity of the land (Altieri 2000: 77). However, when there were down turns in the market due to overproduction, farmers would sell their under priced grains to commercial feedlots. Investors encouraged these changes by investing in feedlots and the production of grains for feed. This became a more profitable practice than producing range-fed animals (Carlson 2001b: 268; Huntsinger 2002: 79).

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[158] In 1992 there were 46,450 commercial feedlots in the United States, down from 78,000 in 1980. The trend has been to increase the size of the feedlot that are owned by fewer and fewer companies. In 1996, industry giants like Continental Grain could hold up to 400,000 head of cattle at any one time, Cactus Feeders, in the number two spot, could hold 330,000 head, followed by ConAgra with 300,000, and Cargill coming in at 285,000 (Kneen 2002: 44).

[159] To remain an economically viable nation of the periphery, Argentina is pressured to grow Monsanto's Soya products for feed for livestock for other core nations, and is especially destined for feedlots in Europe (Blackwell 2003).

[160] University of Alberta scientist Stephen Moore, chair of the Beef Genomics Program believes that mapping of the bovine genome could increase beef production and lead to better quality steaks on the barbecue in future. Researchers have identified molecular markers—DNA fingerprints—that may encourage faster growth, more marbling and more efficient digestion. Improved digestion is important because of the amount of greenhouse gases produced by a cow each day and may also lead to the cow requiring less and cheaper feed; however, this research is still in its initial phases. Specific genes that account for these attributes, however, are just beginning to be identified (Struzik 2001, December 10). Despite these efforts there will never

There have been other environmental consequences as well. Cattle routinely suffer from BIV (bovine aids), bovine tuberculosis (mastitis, deformed cattle, shortened life-span), and bovine viral diarrhoea, all due to the stress of eating a diet not natural for cattle. Moreover, they are routinely injected with rBGH and IGF-1 growth hormones that have been directly linked to cancer in humans (Goldsmith 2001). Cattle feed has moved from grass to clover and turnips to a combination of chemical, grains, antibiotics, growth hormones, and rendered down animals.[161] Within the beef industry investors have seized

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come a point when cattle will not have to be fed. Moreover, the problem of genetic modification, like many scientific innovations done to increase productivity, I am thinking here in terms of Monsanto's promises that cross-breeding of GM crops would not happen, when in fact it did, creating a species of 'super' weeds that now need stronger chemicals to kill them, seem to be implemented much sooner than is warranted merely to shore-up productivity and maintain a particular economic ideology.

[161] In 1997, Canada and the United States banned the feeding of rendered protein from ruminants such as cows, sheep, goats, elk, deer, and bison to other ruminants because the practice was linked to BSE outbreaks in Europe. However, cows can still be fed animal protein rendered from horses, pigs

upon these practices as a way to create profit, while ignoring the ecological consequences.

Commercial feedlots raise ethical questions about the treatment of another sentient species prior to slaughter. Presently, throughout the beef industry there is little moral accountability to the public. Close confinement and 'enhanced' feed are not natural and requires excessive amounts of antibiotics to maintain the health of the animals in such close quarters during the fattening phase of production. These high-density factory-farming practices are a breeding ground for the spread of disease, especially respiratory diseases among the animals and *e coli*, which is why cattle are routinely fed and injected with antibiotics and growth hormones.[162] Currently 70 percent of all the antibiotics produced in North America are used on livestock and poultry (Salvi 2004). Commercial feedlot practices are further evidence that crises are only dealt with from 'within' the structural constraints of capitalist economic relationships. Corporations benefit from these practices at the expense of the environment. It is now a concern that ranching and farming are so chemically dependent the process may be irreversible (Gracia and Guthierrez 1999), suggesting meaningful structural change within the agricultural sector may by much more difficult than is normally thought.

Another change meant to increase productivity has been in feed patterns. Traditionally cattle were fed until the age of four and were 'fattened' on grass before being sent to slaughter. Today a rancher either (1) sends calves to a feedlot at about six to seven months of age where they are fed 'feed' over the winter and then slaughtered at

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and poultry because they are not susceptible to BSE (Jeffs 2003, May 23). BSE was first identified in Britain in 1986, and is believed to have jumped from sheep to cattle. Canada's first case occurred in Alberta in December 1993. Its impact on people has really been minimal. Only 125 human cases of new version of Creutzfeldt-Jakob disease have occurred around the world, and those have mainly been in Britain (Picard 2003: 21).

[162] It has been reported in the *Washington Post* on 19 June 2003 that McDonalds will directs its meat suppliers to reduce the amount of antibiotics and stop the use of growth hormones altogether world-wide by the end of 2004. McDonalds executives claim they are motivated by the hope that this will change how animals are raised, in part by pressuring suppliers will have to keep records and submit audits. According to the Animal Health Institute (AHI), which represents animal drug manufacturer say twenty million pounds of antibiotics were used in 2001, of which the Union of Concerned Scientists claims that up to fifty percent of that total is used to promote growth in cattle. The over use of antibiotics has made their use less effective in humans. The Food and Drug Administration in the United State is facing regulatory challenges from businesses that want to ensure the status quo. The use of antibiotics has been reduced in the European Union except to treat outbreaks of disease and treat sick animals, and as a consequence bacterial resistance to antibiotics has declined, though more antibiotics are now needed to treat sick animals. The AHI claims the Europeans have no scientific evidence that their actions are working (Kaufman 2003). This policy has obvious and serious implications for the entire structuring of the beef industry, and is a clear example of how difficult it is to separate cultural, social, or economic influences. More importantly, it will raise issues about the possibility and difficulty of sustainability versus productivity, especially if the restructuring requires the need for more pastureland.

about a twelve to fourteen months old, or (2) mid-sized calves are kept and fattened for a year and then moved to a feedlot for fattening, taking longer than (3) smaller calves, which are kept for up to a year and then sent to a feedlot before slaughter. The goal is for the feedlot to produce the fattest most standardised cow for the lowest costs. A more recent trend among many feedlot operators is to reject calves that take too long to fatten thereby increasing their costs (MacLachlan 2001: 65). Companies like Cargill are involved in almost every stage of the production process, except for the actual production of cattle. Their strategy is to provide a market for ranchers without assuming any of the risks or costs of production, while offering low prices to struggling farmers (Kneen 2003, April). Ideally, the meatpackers want the cattle-raiser to absorb most of the feeding and "finishing" costs.

Environmental impacts of Feedlots

The United States has only five percent of the world's population but produces twenty-five percent of the greenhouse gases. One survey found that seventy-five percent of Americans think global warming is an important to serious ecological problem and sixty-seven percent of Americans think something should be done about it. Unfortunately, the problem is a long-term one and by ignoring it politicians suffer little short-term political risk (Kluger 2001, April 9). More specifically, livestock account for three percent[163] of those greenhouse gases. One way to reduce these emissions, according to participants of the 1992 World Summit, and documented by the Food and Agriculture Organisation (FAO), is to return to using certain forage plants, crop residues, and manure as sustainable practices that would create an environmentally sound biomass beyond the need for fertilisers. These changes would reduce intestinal gases (methane emissions) from cattle (FAO 1993).[164] This is of course is a generalized problem throughout the industry, and not peculiar to feedlots. Although, siting feedlots next to rural communities also raises questions about air quality, especial around the issue of foul smells.

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[163] This figure refers to the methane gases produced by the digestive process. It does not include other climate-change pollutants, such as fossil fuels, used at the various stages of production throughout the a network of interconnected commodity chains.

[164] As a result of greenhouse gases, a report by more than 600 of the world's top climate-change scientists have found that unless we reduce greenhouse gas emissions the planets temperature will rise any where from 1.4 to 5.8 degrees during this century (Jaimet 2001).

Today, however, the number one problem directly related to the use of commercial feedlots is what to do with the twenty-five kilograms of manure and fifty litres of urine that each cow produces every day.[165] The disposal of which is no small problem. Faecal waste produced by livestock in North America is one hundred and thirty times more by volume than is produced by the entire human population of North America (Clark 2000: 240). Commercial feedlots provide two sources of water pollution: one is surface run-off from the cattle pens and the other is inability of the land to reabsorb the high levels of nitrates, phosphates, and bacterial *fecal coliform* (MacLachlan 2001: 85). The rotational system used in earlier times may no longer be practical because of the volume of waste produced by industrialised agriculture,[166] and nor is it practical in terms transportation. It is far cheaper to buy chemical fertilisers containing nitrogen and phosphate than it is to collect and transport manure. It would be a very labour intensive practice. It is much easier to use synthetic fertilisers to force grow feed crops in amounts that would not otherwise be possible. Most feedlots have land put aside just for spreading manure on, but even that is not sufficient to deal with the amount of manure produced or to avoid nitrogen build-up in the soil and seepage into water (MacLachlan 2001: 81-3).[167] The fact is, just less than half of livestock waste is used to fertilise fields, and the rest becomes water and air pollution (Nierenberg 2001: 31). Today manure and pesticides[168] seep into groundwater or run-off in rivers and bays causing algae growth and spread toxic microbes that kill aquatic life (Clark 2000: 222). The problem is that nitrates from cattle manure do not degrade but accumulate in the soil (Bosselmann 1995: 48) making seepage inevitable. The other hazard is to the animals themselves. At present manure is generally left uncollected or at best piled-up in the pens until the animals have finished their 120 day cycle of fattening.

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[165] This is not the only environmental problem associated with cattle-raising. Since cattle eat feed crops, which represent about seventy percent of all the grain grown in the United States, all of the environmental problems linked to those production practices are directly and indirectly related to the raising of cattle. For example, though not directly related, eighty percent of all the herbicides used in the United States is used on feed crops (Rifkin 1992: 13), and ninety percent of American croplands are loosing soil faster than replacement rates, while fertilizers and constant tilling are destroying the soil structure (Jackson 2002: 68, 70), and the list could go on—desertification, soil erosion and exhaustion, water and air pollution, overgrazing, trampling, &etc still remain important environmental issues. Feedlots, though, have become a special problem in the quality and use of North American water resources. Alberta, for example, has doubled its use of irrigation between 1965 and 1985, and by 1995 just over 1 million acres of cropland is irrigated. Of that, forty-three percent are forage crops. Cattle-raising in Alberta could not survive without irrigation (MacLachlan 2001: 58-9). I mention, briefly, the environmental problems with feedlots because the operation of those feedlots is a major organizational development in the beef industry that emerged for no other reason than to create efficiency in the production process. Overall, advances in technology and efficiency have increased productivity by fourteen percent from 1980 to 1999 (Field 2002: 186). While environmental costs continue to be externalized through the land, the animals, and is now even affecting human health.

[166] At present, without chemical fertilisers McNeill claims agricultural production would need a thirty percent increase in cropland to meet current production levels (McNeill 2000: 25). Paradoxically, the agricultural boom ended in the 1980s, because for the first time there was a seven percent worldwide drop in grain production caused by desertification and soil exhaustion (Rifkin 1992: 158). For rangeland the situation may not be that much better. A 1990 study by the Bureau of Land Management and the US Forest Service reported that only one third of the public lands used for gazing are in good or better condition and that forty percent of all the nitrogen fertilizers used in the United States are used on corn crops destined to become feed for cattle (Steinberg 2002: 200-1). There is a backlash to intense agricultural practices that may now only be solved by developing genetically modified materials that can survive those conditions, yet anther example of solutions to crises being tied to productivity.

The problem of animal waste has raised issues about siting feedlots. The state of Kansas instituted the first regulations governing the operation of feedlots in the 1950s (MacLachlan 2001: 81). In the United States the Clean Water Act of 1972 has since been the governing document for regulating the run-off of waste into the water system. At the national level this Act has been followed by a number of amendments and other Acts, but there has been little political will to enforce these laws, especially because of budget cuts under President Ronald Regan in the 1980s and too many overlapping jurisdictional issues. Therefore, much of the responsibility for regulating water contamination was passed onto the states (Switzer 1998: 163-4). State governments, in turn, have allowed local communities to set their own standards in an effort to attract jobs to their communities. Consequently, standards and regulations vary from jurisdiction to jurisdiction. Some communities do not want feedlots in 'their backyard' and impose stricter regulations than other jurisdictions to discourage feedlot operators from applying for permits in those areas. Because of this situation, it is often easier to expand the size of a feedlot than it is to start another feedlot at another site (Duncan *et al* 1997: 15-7), leaving an obvious avenue for abuse as small rural communities compete for even low paying meatpacking jobs.[169] In Canada the situation it is not much different. In Alberta, the County of Lethbridge has continual problems with water quality because of the concentration of cattle in a small area.[170] Alberta's Code of Practice, which governs feedlot practices, has no penalties for violating any of its' guidelines (MacLachlan 2001: 83). Twenty-four percent of all feedlot operations in Alberta do not have sufficient land for the disposal of manure. A study in the County of Lethbridge has concluded that it has insufficient land space for the number of feedlots in operation within its jurisdiction. This concentration of cattle-raising activity has gone beyond the century's old practice of manuring fields as a means of revitalizing soil and maintaining ecological balance. The result is water pollution, which has increasingly becoming a major social and environmental issue.

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[167] The tragedy at Walkerton Ontario in May 2000 that resulted in six deaths and thousands sick has been traced back to a calf-cow operation in the area (MacLachlan 2001: 86). The Sierra Legal Defence Fund in response to the Walkerton tragedy have reported that Canada's "drinking-water woes will worsen as development degrades more water sources and aging water infrastructure fails to receive the investments needed for its renewal and upgrading." The biggest health threats come from poisonous micro-organisms, toxic chemicals, and radioactive material, and lethal single-cell parasite cryptosporidium, which come from manure (Mittelstaedt 2001).

[168] Pesticide use has tripled from 215 million pounds in 1964 to 588 million pounds according to 1997 USDA figures (Jackson 2002: 70).

Meatpackers

The concentration of meatpackers has increased dramatically since the 1970s (Stanley 1994: 129). As of October 1997, eighty-one percent of the beef slaughtered in the United States is done by the 'big three:' IBP, ConAgra (Armour, Swift, Monfort, Miller), Cargill (Excell)—when Farmland Industries (National Beef) is included with the others that figure rises to eighty-seven percent. These same four also control forty percent of the entire agricultural market. Cargill, for example, is the world's largest merchant of grain and grains used for feed, the second largest feed merchant, one of the three largest processors of beef and hogs; they own production facilities for fertilisers and pesticides used in the production of forage (Kneen 2002: 45). Similarly, ConAgra is also one of the world's largest merchants of fertilisers and agricultural chemicals. This concentration of power allows these trans-national corporations (TNCs) to significantly influence local, regional, and global markets (Heffernan 2000: 65-69).[171] Together these TNCs each own and operate their own feedlots, transportation (trucking, shipping and rail), and distribution networks.

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[169] In Canada the situation seems to be similar. The meatpacking at High Level Alberta prepared a report for the Alberta Government in which it was known before hand that the year round flow of the Highwood River was not sufficient to dilute and carry away the over three million litres of effluence, chemicals, and solvents generated daily by the plant, and by the reports own admission this did not meet Alberta's environmental standards of the time (Cargill Ltd. 1988).

[170] Known as "feedlot alley" there are a number of feedlots in a 500 square-kilometre area North East of Lethbridge that can hold about 700,000 cattle. This is the most intensive cattle feedlot environment in Canada. A five year study of the Oldman Basin (about half complete at the time of this article) was launched after an earlier federal-provincial study revealed significant surface water pollution and some contamination of shallow aquifers and finds that phosphorus builds up too quickly in soil treated with livestock manure. The problem Alberta faces is that if phosphorus-based regulations are

There is also within the meatpacking industry an imperative to increase standardisation of the animals. The biodiversity among cattle breeds is being sacrificed to produce a "world steer" bred to meet North American and Japanese standards of marbling and taste. Most of that higher quality of beef is produced in Canada and the United States. Animals that graze in pastures carved-out of the rainforests of South America are of a lower quality and are therefore distributed to markets elsewhere in the world. Standardization in the global "livestock complex" is creating divisions in the marketplace between rich and poor (Friedmann 1994: 271). This puts additional downward pressures on North American cattle-raisers to further lower their costs, while the environment is still being degraded, even though there are many more laws intended to protect the environment. It seems the political will to prevent environmental degradation is dependent upon economic priorities.

The costs of labour continue to decline. The 1980s and 1990s were characterized by international conflict around food production over the rush to privatize and deregulate markets that have now "enslaved" many people (Friedmann 1995: 16). After 1990 American meatpackers have been hiring "illegal aliens" to work in plants, and American employment agencies are encouraging refugees to take meatpacking jobs, especially among South East Asian refugees. Not only is this a cost reducing strategy; using migrant, non-English speaking workers also means a decline in union activity (Schlosser 2002: 161). Meatpacking used to pay a middle class income. In 1968, only 15.5 percent of plant workers were minorities in the United States and in 1969 meatpacking wages were 115 percent of manufacturing wages. By 1989 wages had fallen to 82 percent. It is the increased competition among meatpackers and the need to increase efficiency that

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introduced, about five times as much land will be required for manure spreading, but cannot be ignored because of the health and ecological problems (Fallding 2000: December, 30).

[171] Wallerstein has also noted that supply and demand can be manipulated by monopolies. This is especially true of vertically integrated businesses that can sell inputs and purchase outputs within the same commodity chain. This also allows vertically integrated business to move more of the surplus wealth to the core where capital is concentrated (1983: 29, 32). The strategy being that the 'longer' the commodity chain the more hidden are the economic relations, and that is the most effective way to minimise political intervention (1999: 58).

generally compels them to relocate in rural communities where their operations generally go unnoticed by the greater public—usually into towns with populations under twenty thousand where they have no chance of getting all the necessary labour locally. A situation they then exploit as justification for the use of migrant labour (Stanley 1994: 132-41).[172] The trends in Canada's labour situation are quite similar to those in the United States, with the exception of employing illegal aliens. In general, labour patterns in Canada have followed those occurring first in the United States (2001: 244).Meatpacking was once one of the highest paying manual labour jobs in Canada during the 1950s, 1960s, and 1970s. Union activity has declined since the mid-1980s (MacLachlan 2001: 215, 220). The main social group working in meatpacking plants are newly-arrived Sudanese immigrants.

Lower wages, standardisation, increased automation and mechanization throughout the agricultural sector, plus all the efforts to manipulate the breeds and feed are systemic issues resulting from a clash between the practices of the beef industry and nature. As a result, it is becoming more and more difficult to "hide" the stresses imposed on labour and the environment.

Captive Supplies

The manipulation of a captive supply refers to the practice of controlling prices by controlling the rate of slaughter. This is accomplished by owning a large number of cattle that are ready for slaughter. That is, if the meatpackers own the stock, which they have bought directly from the rancher, but also the feedlots, they can manipulate the price they to pay to ranchers by refusing to buy more cattle and slaughtering their own stock until ranchers accept wherever price is given. Cattle-raisers are then compelled to take the price they are offered by the feedlot or risk the additional costs of holding on to their cattle while they wait in hopes of receiving a better price in the future. In effect, ranchers, and farmers for that matter, since it is the same TNCs, have even less control of marketing their product than they did at any previous time. This has become more of a problem as corporations seek to monopolise the industry, especially since the 1990s. Any gains made by ranchers in the form of co-ops or livestock associations after the 1920 Consent Decree have been all but lost. There are now fewer competing interests for ranchers to choose between when selling their cattle (Gracia and Guthierrez 1999).[173] These TNCs have this leverage because the government has not intervened to stop the return to highly vertically-integrated corporations that have the ability to offset their costs by forcing lower prices onto the cattle-raisers (Huntsinger 2002: 7979-80). These downward pressures trap the cattle-raiser because he or she is still subject to the seasonal calving cycles of cattle and so needs to sell his or her cattle as soon as they are ready for market.

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[172] Individualism has emerged through capitalism, which has at once opened doors to wealth for some, while simultaneously increasing competition among all individuals over resources (Wallerstein 1983: 151). Moreover, historical capitalism did not invent sexism or racism; it takes advantage of existing racist and sexist attitudes, finding a correlation between the division of labour and the "valuation of work." In other words, the capitalist world-economy depends upon the existence and deepening of social cleavages (1983: 24; 2000).

Cargill, IBP, ConAgra, and National Farms each own feedlots that they use to maintain their own herds for the purpose of controlling prices. These four TNCs currently control twenty percent of the market through captive supplies, though "On any given day in the nation's regional cattle markets, as much as 80 percent of the cattle being exchanged are captive supplies," while the "prices being paid for these cattle are never disclosed" to the public (Schlosser 2002: 138, also see Field 2002: 187). One such feedlot in Greeley, Colorado is owned by ConAgra and holds up to 150,000 head. They get these herds from two sources, either from imports or through private contracts with local cattle-raisers. By owning the feedlots and the livestock, the meatpacker can control the rate of slaughter, and therefore the price, by withholding supply or flooding the market. This practice goes beyond the borders of North America. Corporations also manipulate prices "at home" by buying cheaper imports, putting even greater pressure on North American cattle-raisers. Commenting on this situation in North America, including, in this case, eastern Canada, Jacques Prouix, President of *Solidarite rurale* (a cattle association in Quebec) complained that the notion that free markets set prices is nonsense. The big corporations exploit cattle-raisers, farmers, and resources around the globe by buying from whoever will sell their products for the cheapest price. As a result, it is not uncommon to find many independent ranchers in North America having to

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173 Meatpackers who generally own feedlots protect themselves from fluctuations in the market by getting the producer to pay a fee per animal until the

supplement their incomes off the ranch (Gracia and Guthierrez 1999; Sullins *et al* 2002: 29), or rely on credit (Bud 2002: 41). TNCs could not ignore the plight of ranchers without government subsidies. In effect, government subsidies to American agriculture allow TNCs to exploit farmers and ranchers to increase profits by externalizing the labour and ecological costs of production to society and the environment. Financially strapped ranchers become the problem of society, while TNCs wash their hands of responsibility. If the government did not support ranchers, TNCs would have to pay higher prices, risk losing their supply of cattle, or become involved in cattle-raising. The problem, of course, is how much of those costs can be internalized before the public can no longer afford beef. As it is now, ranchers are not price setters, but price takers.

Post war auctions have now been replaced by direct-to-packer selling, and since 1985 about ninety percent of all transactions are of this type. This further encourages the growth of feedlot practices (MacLachlan 2001: 92-96). Ranchers may now send their cattle, via trucking firms, directly to the feedlot/marketplace. What is interesting from the social historical perspective is that during the 1990s, ranchers again began forming alliances among themselves before contracting their herds to the feedlot operator with the goal of impacting the price they receive from the feedlot. By banding together, cattle-raisers hope to influence the feedlot operator to pay a better price for their cattle (Field 2002: 189). This is a practice in progress, and how effective it will be in the end is difficult to say, but it is significant in that it is similar to the situation occurring at the turn of the last century.

Cattle-raisers

The usual economic cycle of ranching is that whenever prices are high the response is to overstock and overgraze the land and overproduce for the market. Then when prices fall ranchers reduce production, which means a reduction in income and a struggle to remain economically viable. This is an historically recurring cycle (Field 2002: 185). Costs include: technological costs, costs for land, grazing permits, buildings and improvements, machinery, and the livestock itself coupled with the demand to keep costs

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animal is slaughtered. This ensures the packer has a captive supply of finished cattle (MacLachlan 2001: 69).

low from the meatpacker. All of which have to be recovered in the sale of the stock. In the late 1990s the average rate of return for the individual American rancher running a 300 hundred head operation was approximately a two percent margin. Therefore, to stay on the land, ranchers need to make their decisions based primarily on economics (Butler 2002: 198). Operations of scale matter to the economic success of a cattle-raiser. A rancher running a ranch with 500 head of cattle has half the costs of production per head than a ranch with less than 50 head, yet most operations in the United States have less than 50 head and fewer than ten percent of all operations in the United States have more than 100 head. In the United States the majority of cattle-raisers are small operations and together they account for less than a third of the cattle slaughtered (Field 2002: 186). In Alberta the trend is the same. Of the 31,774 ranchers in Alberta (Dudley 2003: 68) each has an average of about 63 head (45 nationally) (MacLachlan 2001: 20). What this means is that while the majority of cattle-raisers are small independently owned operations, they are being overshadowed by a few large scale operations (usually under private contract to a particular meatpacker/feedlot) that can spread their costs across a greater number of cattle and therefore able to accept the lower prices offered by feedlots operators and still stay in business. For the smaller cattle-raisers the options are limited. They can find either a niche market, diversify economic activity on the ranch itself, work off the ranch, or sell the ranch (Field 2002: 188).

The ranch as a unit of production has itself has been subjected to the processes of proletarianization. Though M'Gonigle and Demsey are talking about this process in relation to forestry, their analysis can easily be applied to cattle-raising. They argue that economic industrialisation has been dislocating people from their sense of place for generations by drawing people off the land. Human communities become suppliers of resources as the processes of industrialisation become "entrenched in the landscape" (M'Gonigle and Demsey 2003: 104). Essentially, large Corporations have few ties to communities beyond the economic. This situation for cattle-raisers has become very apparent in the post WWII era. Rural cattle producing communities are struggling to compete within a corporate-run industry. Cargill's strategy, according to Brewster Kneen in *The Invisible Giant* has been to undermine producers in both the core and the periphery by creating dependency. That is, producers become dependent on large corporations for market access, pricing, and the distribution of their product. In the core that has meant that cattle-raisers struggle to remain financially viable, while for those in the periphery it means meat is exported to other markets, while locals often go without because of lack of buying power (Kneen 2002: 10). In effect, many cattle-raisers have become "captive" wage-labours for the corporations controlling the industry.

One of the key issues for ranchers in their effort to keep costs down is having access to grazing lands. There has been a fifteen percent decline in rangeland from 1964 to 1997 in the United States, even though sixty-one percent of the land area of Idaho, Montana, Colorado, New Mexico, Nevada, Arizona, Utah, and Wyoming is still dedicated to rangeland. The main reason for the loss of rangeland has been due to urban development, much of which has been for second homes for vacationing (Sullins *et al* 2002: 25-7). Population growth, urbanization and the sub-dividing of land into hobby farms are eating into the country's available rangeland. That loss increases the environmental risks to the remaining areas. Fifty-nine percent of American rangelands are in poor condition (Friedmann 1999: 37).

Access to water is also a major concern. Ranchers must compete for water rights and access with urban centres. Access limited to riparian areas are insufficient for industrialised cattle production, and Friedmann reports that grazing is responsible for destroying up to ninety percent of those areas[174] in the American west, which are necessary for the survival of almost eighty percent of the regions wildlife (Friedmann 1999: 7). Battles over access to water between ranchers and Denver's city council have resulted in many ranches going out of production (Sullins *et al* 2002: 26), and just one example of a growing tension between urbanizing and growing populations and cattle grazing, both of which are responsible for the destruction of the land (Knight 2002: 124; Leonard and Elmore 2002: 145). These social policy issues all contribute to the deterioration of the land, though who is to blame is much contested. Richard Knight, a professor of wildlife conservation at the University of Colorado, writes that urbanisation contributes more to loss of biodiversity[175] than ranching (Knight 2002: 132). Clearly, environmental issues can rarely be reduced to one source. However, overgrazing will clearly become a growing problem if rangelands continue to disappear while the demand for beef continues to grow in the face of a growing population. The answer for people like Friedmann is to re-focus society's attention back toward foodgetting tied to natural cycles (Friedmann 2000). In other words, what is required is a reintegration of the "natural cycles" of agriculture back into the consciousness of human activity, in the belief that it will change agricultural practices.

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[174] Riparian areas refer to the ecological systems near river banks.

[175] Many cattle-raisers see themselves as preserving ecological integrity and argue that the damage to the land and the source of that damage is still a contested issue. Environmentalists typically want to 'rest' the land to preserve it versus the scientists who realise that "disturbing" the land fosters growth

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and diversity (Knight 2002: 127). The Intermediate Disturbance Hypothesis used by Europeans states that a moderate amount of environmental pressure generates biodiversity, and that 'low-intensity' practices are good for the land (Starrs 2002: 16) and there are claims that holistic management of ranges and cattle result in increased biodiversity (Dudley 2003, July/August: 333).

CONCLUSION

> The past and the present are not only connected, they are also metaphorically identical. The lessons of a story from the past apply equally well to the present. Myth rips events out of context and drains them of their historicity.
>
> Richard White (1991: 616)

The initial concern of this thesis was that the ecological problems created by cattle production are giving rise to more environmental damage than is sustainable. How the beef industry deals with those problems seems to me unimpressive, but not surprising. Over time the industry has been increasingly constrained by a commodification process resulting from a capitalist mode of accumulation. Consequently, the industry tends to resist change to more ecologically sustainable practices unless it is economically profitable or they need to respond to a crisis they can no longer avoid. Furthermore, the tendency to focus my analysis on the United States only reflects the degree to which their national interests, economic wants and needs and their legal system have impacted cattle production in the rest of the hemisphere. The diffusion of cattle across political boundaries into Canada, particularly Canada's west has had little impact on how cattle are raised or processed, and is itself a direct descendent of the Texas cattle-raising system. Cattle production is a world-system within a multiple of other world-systems and as such it has its own "internal logic" that is weakly or strongly influenced by those other world-systems. Political borders in North America are secondary to how the industry was organized and spatially distributed. To that end, I have attempted to document, at least in part, how the transition from one set of practices to another was conditioned by the practices that came before it from the point of view of the cattle industry. Therefore, I went to the historical record to examine some of the secular trends in cattle production in an effort to see if the situation today is historically unique or part of an historic trend related to the "logic" of capitalist accumulation. In particular I have examined and described the historical processes of commodification, mechanization, expansion, and to some degree population growth[176] as they have impacted the raising and processing of cattle for food and a variety of other by-products.

Moore's notions of *commodity frontier* and *systemic cycles of agro-ecological transformation* have been especially useful. The commodity frontier has allowed us to examine the historical movements and geographical changes ensuing from cattle-raising and processing practices within the world-system. It opened-up an opportunity to recount the changes cattle have had on the land as a consequence of the commodification process. In examining these cattle frontiers the notion of *systemic cycles of agro-ecological transformation*, a merger of Arrighi's *systemic cycles of accumulation* and Foster's *metabolic rift*, suggest that the political economy and ecological degradation are an internally related set of problems. Since history does not produce random outcomes, the implementation of human innovations as solutions to historical crises is also not random. Applied to cattle, it became apparent that cattle production has had a similar impact on the nutrient cycles of the land as has crop farming—metabolic rift. Cycles of overgrazing and overstocking are the result of efforts to raise productivity and are causally related to economic cycles of expansion and contraction. Repeated cycles degrade the land requiring cattle-raisers and processors to change location, resulting in the expansion of the world-system when suitable land is available and/or the introduction of some technological or managerial innovations, which are more useful ways of raising productivity when access to land is limited. This is especially apparent in the capitalist world-economy as the principles of private property consistently resulted in the commodification of land after the enclosures movement beginning in the sixteenth century. I think the preceding chapters have shown that the relationship between cattle production and land use has been shaped both by a dialectic between a capitalist economic relationship and ecological transformation. The outcome of which has since become a template for socio-ecological interaction resulting in a series of unintended environmental crises.

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[176] This paper has not undertaken to discuss population growth in the context of supply versus distribution (Malthusianism), but it does seem self-evident that continuous population growth within a closed bio-system is at the very least a serious force for contradiction (neo-Malthusianism). We are currently adding another billion people every twelve years (Dyson 1996: 13). Though this argument is beyond the scope of this paper, I have continued to mention it as an important secular trend within the world-system, since population growth is also a requirement of capitalist world-economy as a source for economic growth. Beef exemplifies this clash around access to space and resources, and raises the possibility that cattle-raisers cannot practice environmental sustainability and produce enough beef for a growing population by reducing grazing intensities to sustainable levels without the need for more land (see Golanky 2003; McNeill 2000).

Within the "logic" of the capitalist world-economy changes in cattle production are wholly dependent on responding to the immediate economic crisis by increasing productivity. This approach is directly related to the ecological transformation and degradation. BSE is a recent example. It was the unintended consequence of trying to recycle animal waste back into the system. Demonstrating how for economic reasons meatpackers and feed producers try to increase the utility of nature, but from within the very limited scope of conforming to the capitalist mode of accumulation. By creating feeds that use waste by-products the industry further reduces its input costs and increase its profitability. This type of scenario seems consistent with the historical record. With respect to my general research question—'does capitalism lead to sustainable cattle-raising and production practices?'—the answer from an historical perspective must be no. In fact the opposite seems to be true. The commodification of beef industry practices shows a long (though uneven) process of deteriorating environmental conditions in the areas where cattle are raised and processed. It is only since the industrialization of agriculture after WWII that environmental degradation has become more global in scale. While we would normally want to resist thinking that ecological degradation reflects a linear, evolutionary process in history, the evidence suggests that environmental degradation, as a general trend over the last five hundred years, has been increasingly moving from highly localized crises to regional crises toward a global crisis. Simultaneously, I find that these crises consistently take place in the fluidity of the peripheral regions of the world-system, away from the industrialized activity in the core. There are structural reasons for this situation consistent with *systemic cycles of agro-ecological transformation*. At the heart of this transformation is the commodification of labour and land, which are only regarded as accounting costs in the production process. The costs of reproducing labour and maintaining the land for capitalist use are externalized to society whenever possible. Both practices result in increased environmental stress.

The overriding socio-historic problem has been the imposition of an irrational system of accumulation. The cultural myth, like that presented by Turner (1893), act to obscure these underlying economic relations, by, as White (1991) suggests, ripping the context out of history. More importantly, myth makes it possible to justify an irrational ideology that prioritizes capitalist accumulation at the expense of social communities and the ecology. Wallerstein describes the problem this way: capitalism has two problematic features. First it is a system that must expand in terms of production and geography. It is an "existential priority" of capitalism to expand both economically and territorially. Second capitalists never pay their bills in that the 'true' costs of production are always externalized to keep costs down. Given this, there are according to Wallerstein three options: (1) governments can force businesses to internalize costs, which Foster (2002) argues may not be possible, (2) the government can pay the ecological costs from public monies, or (3) do nothing, since governments in the core can "buy time" by shifting the ecological problem to the periphery (the South), and/or have the South "postpone" its own development as a means of keeping costs to the environment down (1999: 4-7). These, however, may not be true alternatives, since, as Wallerstein goes on to write, the capitalist world-economy is in crisis today because of its inability to provide solutions; ecological sustainability now relies upon technology to further "conquer" the environment, and increase its utility (1999: 9). The fundamental problem is that the commodification of cattle is now so deeply established that the very 'need' to externalize costs takes away the incentive to find ways to fight ecological degradation. In referring to the historical practices of the beef industry I think a stronger claim can be made. I have found no innovation or any attempts to reorganize the industry that was not first and foremost been concerned about increasing the level of productivity, and subsequently, profits.

Environmental degradation is a social-political-ideological problem more than it is has ever been just an ecological one (Bergesen and Bartley 2000: 314). The overall historical tendency, however, is to ignore environmental degradation until there is a crisis, which generally results in socio-political conflict (Grimes 1999: 39). To understand the reasons for environmental degradation, we have to see them in relation to consumption and production. Certainly, Chew has argued that the ecology and "socioeconomic processes" establish limits for one another (Chew 2002: 220). Similarly, Chase-Dunn and Hall talk about limits in relation to scarcity among human communities.

When there is scarcity, there is conflict that results in the restructuring and reorganization of social practices (Chase-Dunn and Hall 1997). This has been very apparent throughout the history of the cattle industry. They have also found that during times of economic expansion the environment becomes a 'background' issue until there is a crisis. In contrast, when ecological crises emerge the so-called "superstructure" readjusts to the ecological problems threatening society's material "base" (1997: 112). This is not an either/or proposition. The relationship between society and nature, between cattle production and land is an internally related set of processes that are crucial to understanding world-historical transformation.

None of this is to say that there is inevitability to social change, positive or negative. The discussion of causal relationships (*material* and *efficient* causes) between the present and the past do not in any way imply a discussion of Aristotle's *final* causes (teleology), only that social change is "conditioned" by past events. Subsequently, it is not a stretch to realise that under the current economic conditions involving repeated economic cycles of expansion and contraction will deepen the ecological crisis into the foreseeable future. I say this with the caveat that my argument has never been to suggest that innovation is not necessary or unwelcome. I have only suggested that the ability of social groups or individual actors to act independently of their social contexts is not apparent. The ideology associated with capitalist economic relationships pervades that current social context. Resistance to this form of domination and exploitation, however, has been present and varied throughout the period, but the overall historical trend is for capitalist ideas and practices to heavily influence all aspects of social life. Therefore, the innovations that get implemented in the beef industry coincide with the goals of accumulation. This results in a deepening of contradiction, not its resolution. This is why some researchers insist that systemic accumulation based on the exploitation of nature results in the collapse of the system (Bunker and Ciccantell 1999: 119; Moore 2003; Wallerstein 1995: 210-19). The world-system based upon a capitalist mode of accumulation will end when it can no longer manage the internal contradictions inherent in it. James O'Connor makes a similar claim. The exploitive relationship between social practices and ecological degradation represents the "second contradiction" of capitalism, the first being the contradiction between capital and labour. Accordingly, the commodification process defers environmental degradation into the future, which at some point becomes unsustainable and people must either choose reform or to continue until the system collapses (O'Connor found in Bergesen and Bartley 2000: 313). These cycles of crisis and transition usually impact those in the core first and then 'reverberate' throughout the world-system (Chew 2002: 226). Moore suggests a final crisis could take the form of an 'eco-historical' crisis'; though the environment does not so much "decide" historical outcomes for people; so much as people choose to ignore the signs of an impending ecological crisis and adapt accordingly.[177] Chew has documented this tendency in ancient civilizations (Chew 1999, 2002). Since the emergence of a capitalist world-economy, this tendency is further aggravated by a capitalist mode of accumulation. For sociologists like Wallerstein, then, social change is rooted within the internal contradictions of capitalism. Ultimately, the capitalist world-economy will eventually collapse under the weight of its own contradictions, one of those being the contradiction between cattle-raising and land use. Of note, is that these explanations may sufficiently identify and explain historical transformation, but they cannot identify in advance the specifics of a future crisis. Therefore, the current practice of prioritizing productivity seems the most likely trajectory for the immediate future for the beef industry. Change will occur when scientific innovation reaches an impasse or some socio-ecological crisis demands some other form of change.

Human activity is increasingly organised around market forces and not around the geo-historical rhythms of nature. The long slow transformation of geographical time cannot keep up with the intense short-term goals of accumulation. In the agricultural sector this tension results in recurring cycles of economic expansion and contraction. Inherent in this process is ecological transformation and degradation (Foster 2000; Friedmann 2000; Moore 2000a, 2003). The relationship between these different historical times as it is presently constituted contradicts one another. For instance, the most intense cattle-raising in North America is now done on the Great Plains, the area of the North America least suited to the task because of its lack of precipitation. To maintain eco-social harmony in that region would require less intense use of the land. It is plain that the capitalist mode of accumulation applied to cattle production actually creates the conditions for metabolic rifts to occur, resulting in the need for geographical expansion because of over-use of the land. This trend is well represented in the history of cattle as cycles of overproduction and collapse. Clark (2000) adds a very interesting stipulation to that type of expansion. The physical evidence suggests that Europeans could only expand into and conquer geographical regions where "European" lifestyles could thrive and reproduce. That is, if cattle were not so well suited to the Americas in general (and not necessarily every region), Europeans may not have been so successful in expanding the capitalist world-economy into that region of the world. Cattle production could not occur just anywhere. From the beginning, different cattle breeds did better in different regions, but most were very well suited for life in more temperate climes.

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[177] This is by no means a teleological argument. The ultimate purpose of capitalism is not self-destruction; however, it is not unreasonable or illogical to suggest that predictions about future possibilities within a world-system follow from prior historical constraints. History is not stochastic. Chase-Dunn and Hall put it this way: "A teleological explanation is one that explains an outcome in terms of final causes or ultimate purposes," while "social change and evolution are due to prior causes, not immanent purposes" (1997: 255n6).

The human demand for beef puts pressure on cattle-raisers and processors to produce and ship beef by-products and eventually fresh meat once the technology was in place to more distant markets. American beef products primarily went to Britain in the core, which was not only the biggest market for American beef, but also the biggest financier of American production. The continuous demand to maximize profits while raising productivity is what pushes the industry into cycles of overproduction. Overproduction, therefore, is a market driven problem, not an ecological one. It occurs because fluctuations in the market are difficult to manage. Cattle production by its nature lags behind economic indicators. If beef prices go up in one season, it may take another couple of seasons before cattle-raisers can respond to rising prices by increasing productivity. The opposite is true when prices or demand fall. These cycles became more apparent after the 1850s in America when advances in technology made the widespread distribution of fresh meat possible. In the current cycle this problem remains, but is made more manageable because of industry's ability manipulate captive supplies. While the ability to stabilize profit margins has improved the environmental problems have become more widespread and intense. Prior to the 1850s, the environmental problems caused by intense cattle-raising practices tended to be more localized. For instance, in the colonies the need for more pasturage was a constant problem. The lack of it was creating overgrazing and overstocking problems within the colonies, but it was not yet practical to move cattle-raising operations too far from existing population centres because of the lack of transportation and processing facilities. So though in those early years, environmental degradation may have been highly localized, it was still a devastating social problem because the lack of technological sophistication constrained geographical expansion. Nevertheless, the trend in Europe and America was to continually incorporate new land whenever possible as a means to overcoming the problems associated with metabolic rift. Paradoxically, as these new technologies became available it only served to deepen the commodification process that in turn exacerbated the problems inherent in eco-social interaction. The superimposition of the commodification process on cattle-raising and production generates a network of commodity chains that deepen the system of unequal exchange and environmental degradation. The result is *systemic patterns of accumulation* favouring the financiers of beef production in the core states of the interstate system. Friedmann (2000) has since noted that beef consumption has progressively divided along class lines between those can afford beef and those who cannot.

Each eco-historical crisis was followed by a restructuring and reorganizing phase that introduced solutions designed to ensure the continuation of the commodification process. Examples include deforestation, fencing, commercial feedlots, the extermination of the buffalo, etc. Subject to the same economic pressures as Europe, the North American landscape was consciously transformed by short-sighted human activity and unconsciously by the cattle themselves. More recently, spaces for cattle-raising across North America have declined requiring more intense use of the land that is still available. The United States, therefore, has since engaged in its own form of 'economic imperialism' since the 1960s in Central and South America, encouraging the clearing of rainforests for pasturage and the growth of feed crops for cattle destined for consumption in America (Roberts and Grimes 1999:71). It has become the new American commodity frontier.

Today cattle are treated and processed like any other commodity. There is little moral accountability for the treatment of the animals. Industrialized agricultural production now uses more environmental inputs than ever before just to produce a kilogram of beef. It is clear that this type of capitalist production is "outstripping its material gains" (Wood 2000: 40). The efficient use of inputs does not lead to less intense use of inputs, but to more. Environmental economists have responded by trying to cost the earth so that markets will 'solve' the earth's problems without ever considering whether the commodification of everything—economic reductionism—should guide our relationship with nature, or even with each other. Foster, as already noted, argues efforts to incorporate nature into capitalism fail because the "accumulation of economic surplus" based on exploitation would just be expanded, not changed or undermined (Foster 2002: 22-37). That is, costing the environment only leads to a further deepening of the commodification process. Moreover, there are different pressures between the production cattle for human use and productivity based on the exchange value of a commodity. The decision to raise cattle on prime cropland and feed cattle grains otherwise destined for human consumption is a commercial decision, and not a choice based on sustainable practices. It is known that certain levels of grazing are sustainable over time so long as the number of cattle is kept to level where the land (and this varies from place to place and time to time) can replenish itself with minimal human interaction. Alternative practices require close management of the land and the foresight to adjust to ecological changes; unfortunately, many of the decisions surrounding cattle-raising give priority to economic forces; often with the knowledge that high levels of sustained productivity are simply not possible over the long-term. As long as a mode of capitalist accumulation continues to prevail there are good reasons to be sceptical about expecting the implementation of future innovations to fundamentally change the underlying contradictions.

In hindsight, the world-historic transformation of cattle-raising and processing presents us with three obvious conclusions. First, the contradiction between cattle production, especially the current use of commercial feedlots, and nature is intensifying. Second, cattle-raising and processing were an important factor in the broadening and deepening of the capitalist world-economy. Third, and perhaps the most significant for today, is that cattle production is subject to the ideology of capitalist accumulation resulting in forms of industrialized production that are not sustainable in the long run. However, to simply argue that there is a need to change to more sustainable cattle-raising practices in North America cannot be isolated from say the movement west of recreational land users and agricultural hobbyists who buy and fence-off land for those activities. The implementation of sustainable practices is hindered by a number of factors: population pressures, recreational use, limited access to public lands, the ongoing deterioration of land in current use, urbanization are all factors forcing cattle-raisers unto smaller more marginalized land areas of the continent. These trends result in the intensification of the ecological degradation. In the end, given population pressures and the contradictory processes inherent in the interaction between nature and societies, production and productivity, capital and labour, the question is how big a crisis will it take to bring about fundamental and transformative social change?

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